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General Articles

LABORATORY METHODS IN GENERAL PRACTICE*

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Having been invited to take up, in this short paper, some aspect of the vast and important subject of tuberculosis in relation to the milk supply, I proposed to discuss the essential points in the preparation of a milk sample for microscopic examination as a practitioner engaged in the routine examination of cattle for the presence of tuberculous mastitis would have to do it. This having been agreed upon, it became obvious that the simplest and most interesting way of doing so would be to arrange my contribution in the form of a demonstration. I propose first of all to outline, very briefly, the technique involved and then, thanks to the very kind assistance of Mr. Bisset (who has arranged for the apparatus to be at my disposal), I shall demonstrate the method to you and emphasise the important points. If time permits, I also propose to extend my demonstration to include the examination of fæces for Johne's bacilli, parasite eggs or coccidia, and the preparation of films for the diagnosis of suspected cases of anthrax.

Before going further, I would like to emphasise the advantages to be derived by a practitioner who is able to conduct his own examinations. Of course, I am only referring to the simple examinations of milk, fæces, sputum, urine, etc., as others such as biological tests, etc., will always be required to be done by the laboratory. The practitioner, in carrying out his examination, is able to visualise his patient: he knows the possibilities and probabilities, and whilst examining for one thing may find another which will throw considerable light on or even present a new aspect to his case. For example, in the examination of a milk sample for acid-fast bacilli, instead of finding acid-fast organisms he may find a few streptococci or other organisms to account for the condition. The practitioner is also able to examine his milk fresh, a factor of no mean importance in microscopic examinations. Furthermore, a film which may appear negative to the laboratory microscopist, who is limited in the time he can devote to routine examinations, may, after a persistent examination by a practitioner who strongly suspects the case, either prove positive or at any rate justify a further examination. You will see, therefore, that there are obvious advantages to be gained by the practitioner examining the milk himself and the same thing can be said to apply to other tests.

To deal first with the detection of tubercle bacilli in milk: the tubercle bacillus is a member of a group known as the acid-fast group—that is, when it is stained, it resists decolorisation by strong acids. It is an organism which, in virtue of some waxy material which enters into its constitution, it is very difficult to stain, but once stained, difficult to decolorise. Thus by adopting methods which will stain the organism we can determine its presence in a fluid, discharge, fæces, etc., and also distinguish it from other organisms, which may be present but which are not acid-fast. It is important to remember, however, that it is not always possible to say with certainty that such-and-such an acid-fast bacillus is a tubercle bacillus as, first of all, it is not the only acid-fast organism and, secondly, although it has very definite peculiarities of shape, size and arrangement, modifications occur which may raise doubt in the mind of the microscopist as to whether it is the acid-fast organism of tuberculosis or some other acid-fast bacillus. We do know, however, that with the exception of the tubercle bacillus and Johne's bacillus, the other acid-fast organisms are of a saprophytic nature and do not live in the animal body, and this is where the practitioner microscopist comes in. If he knows his cow to be a typical case of tuberculous mastitis, and if he can satisfy himself that every precaution has been taken to avoid the introduction of organisms from other sources—*e.g.*, a small particle of fæces from the teat or body of the cow—then he can be tolerably certain, provided his film is properly prepared, that if the acid-fast bacillus presents any resemblance to the tubercle bacillus, then it can have come from one place only and that from the interior of the cow, most probably the udder. It must be remembered that tubercle bacilli or even Johne's bacilli may occur in milk if there has been gross fæcal contamination.

The details of the test are as follows: collect a sample of milk from the suspected animal. It is not necessary that the milk should be sterile, but it is necessary that any possible chance of

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acid-fast organisms getting into the milk from sources other than the milk should be eliminated. Has your bottle been used before? If so, be sure it has been sterilised by boiling. Wash your hands and the teats of the cow, wipe the teat with spirits, and milk the cow straight into the bottle. I know this washing is not always performed; nevertheless, it is desirable, although if care is taken to avoid gross contamination the risk of vitiating the results is small. Collect a minimum of two ounces of milk. Less can be tested quite satisfactorily, but this is the desirable minimum as it provides you with enough milk to fill two centrifuge tubes.

The next step is taken in the laboratory, and it consists of centrifuging the milk (from now on, I propose to demonstrate and explain the method step by step). Fill up two tubes with equal quantities of milk and balance the centrifuge buckets, tubes and milk on an ordinary balance. This is essential to the life of the centrifuge and also to obtain a good sediment. You may use a water centrifuge, a hand or electrical centrifuge, according to the facilities which you have at hand. Approximately 2,000 revolutions per minute for two to three minutes are all that are necessary. If you have only enough milk for one tube, balance it with an equivalent weight of water in the other tube.

Having centrifuged your milk, take your tube of milk, separate the cream from the side of the tube with a sterile needle and invert so as to drain off all the cream and milk, leaving behind the sediment. Invert the tube quickly and keep the mouth of the tube down, in order to prevent any cream adherent to the side of the tube from running into the sediment. Remember that fat is also acid-fast, and to get cream in your sediment means an unsatisfactory film to examine.

Holding your tube in the inverted position, pass into the sediment a flamed loop, which has been turned at right-angles to the needle, and you will get ample material for making a smear. Smear the sediment evenly on to a clean, grease-free slide, taking care not to make the smear too thin; a smear in the form of a square has decided advantages in routine examination. Dry the smear in the air or high up over a flame and then fix by passing through the flame.

Stain with hot, strong, carbol fuchsin for three to five minutes, by applying the flame gently to the slide; keep it steaming but do not boil it or let the steam dry on the film. Wash off the stain under the tap and decolorise with acid-alcohol (1-3 parts HCl in 99-97 parts methylated spirits or 70 per cent. alcohol). We know that the tubercle bacillus is not decolorised by either acid or alcohol. A number of other saprophytic, acid-fast organisms are not alcohol-fast, so by combining acid and alcohol in the decolorising process we reduce considerably the chances of confusing an extraneous organism with the tubercle bacillus. Continue the decolorisation until, after washing with water, a very faint pink colour returns. Everything in the film except such acid-fast organisms as may be present will now be decolorised and once again unstained. To enable one to see such decolorised cells, etc., the film must be counter-stained with a stain of distinctive colour, *e.g.*, 1 per cent. aqueous methylene blue for 30 seconds, and any tubercle bacteria present will stand out, when viewed under the 1/12th oil-immersion objective, as rod-shaped organisms which stain red up against a blue background of cellular material. Finally, blot and dry the film and examine under the microscope.

Glance at the slide under the $\frac{2}{3}$-in. objective and select a suitable corner of the film to commence your examination under the oil-immersion lens. This is much simpler if your smear is in the nature of a square, as you can work systematically from one side to another right through the film. Considerable time is often saved by examining for what are described as tubercle cell-groups, as these groups frequently contain organisms when they are difficult to find in the rest of the field. The outstanding advantage is that they save time, as they can be recognised under the low power brought into the centre of the microscope field and immediately examined under the oil lens. I shall demonstrate these groups to you under the microscope.

The characteristic features of tubercle bacteria are easier to demonstrate than to describe, and I have several slides with me which you can examine for yourselves.

Briefly, the organisms are slender rod-shaped organisms, straight or slightly bent. They may occur singly but are frequently in two or threes, arranged either in parallel formation or at a characteristic angle. They often display a very characteristic beaded appearance due to uneven staining.

Whilst on the subject of acid-fast bacteria, I propose to demonstrate to you a simple method by means of which you can frequently confirm the presence of Johne's disease. In many cases a direct smear of untreated fæces on a slide, stained in exactly the same way as I have described for the tubercle bacterium, is all that is necessary. However, much more satisfactory films and better results are obtained by first of all straining the fæces through wire gauze to get rid of the coarse matter. In some instances, particularly in less advanced cases when fæces are not so fluid, it will be found necessary to make a thin suspension of the fæces with water in order to strain. After straining, centrifuge for a short time with a hand centrifuge in order to concentrate the fæces, and discard the supernatant fluid.

In a positive case you will find clumps or groups of short, red acid-fast organisms, *viz.*,

the bacilli of Johne's disease, standing out from a background of blue-staining organisms, cells, vegetable matter, etc. The organisms present a very typical appearance and the finding of numerous short organisms bunched together in a film, taken in conjunction with clinical symptoms, may be regarded as fairly conclusive proof of the existence of the disease. When the diseased condition is not so advanced the organisms may be very scarce, and success in finding them may only occur after a long and patient search. Remember that a negative finding does not mean the absence of Johne's disease any more than the failure to find acid-fast bacilli in milk microscopically means that the milk is not tuberculous.

Before leaving this subject I must ask you to compare the appearance of Johne's bacilli in fæces with the tubercle bacteria in the milk films which I have placed under the microscope. This will emphasise much better than any description that I can give, the appearances of the two organisms.

Now for a few words about the examination of fæces for nematode eggs or coccidia. This is best done by one of the flotation methods, such as Sheather's method, which I now propose to demonstrate to you. Take a small quantity of fæces in a dish and thin it down to the consistency of water. Then strain through a piece of wire gauze 30 meshes to the inch. Prepare a sugar solution (1 lb. of sugar in three-quarters-of-a-pint of water), mix the strained fæces with an equal quantity of sugar solution, mix and centrifuge with a hand centrifuge for two to three minutes. This brings the eggs to the surface. Now take a cover slip of smaller diameter than the diameter of the end of the centrifuge tube and by means of a pencil of plasticene lower it into the mouth of the tube, just touching the surface of the liquid, when the eggs will adhere to the cover-slip. Now place the cover-slip on to an ordinary slide and examine under a low-power lens. This method can be used for determining the presence of worm eggs (except fluke eggs) and coccidia in fæces, or in order to concentrate mange parasites when the hair and cells in the skin scraping have been dissolved in 10 per cent. caustic potash solution. In the case of fluke eggs this flotation method is of no value, as the eggs are damaged in the process and sink to the bottom. So far as tapeworms are concerned, the eggs, as you know, are mostly confined in the unruptured segments which appear in the fæces.

Finally, the microscopic examination of blood for *Bacillus anthracis*. The method which I am going to describe and demonstrate to you is that described by M'Fadyean in 1903. First of all, I should like to point out that what I say in reference to blood films in connection with this method also applies to films from œdema fluid from the throat region, when such examinations are indicated. As you are well aware, cattle when freshly dead of anthrax invariably display numerous anthrax organisms in the blood, but in the case of pigs they are often so sparingly present as to make the ordinary blood-film examination unreliable. In such cases examination of the œdema fluid from the pharyngeal region is more satisfactory.

First of all, prepare your film from blood or œdema fluid, taking care not to make your film too thin. The practice of making films by compressing a drop of blood between two slides should be avoided, as the resulting films are much too thin. Good results are obtained by using a swab and smearing the blood evenly on a grease-free slide so as to occupy an area approximately equal to that of a postage stamp. Then follow the drying, fixing and staining of the film. Although this may sound very simple to you, results are often very unsatisfactory, merely as a result of lack of attention to detail. First of all, dry the film in the air and, when dry, fix the film to the slide by passing the slide film upwards three times through a Bunsen or other suitable flame until the under surface of the slide is just too hot to be borne when applied to the hand, the object being to heat the slide to a temperature just over 100°C. Do not overheat it or failure will result. Furthermore, make sure the film side is uppermost when passing through the flame; otherwise, when you come to stain your film you will stain soot as well. When the slide has cooled after fixation, stain with an aqueous solution of polychromatic methylene blue for a half to one minute. Wash off the stain; dry first with blotting paper and then by holding in the warm air high over the Bunsen flame; examine under a 1/12th oil-immersion lens.

In an anthrax film the groundwork of the film will display the typical purple colour spoken of as M'Fadyean's methylene blue reaction. This purple groundwork is due to the peculiar staining property of the ruptured capsules of the organisms. Any method of fixation which fixes the capsules fails to reveal this diagnostic feature, and the same thing applies if in the process of fixation the films are heated to too high a temperature. The purple-stained detritus is always more marked in the neighbourhood of the anthrax bacilli. The organisms themselves, in films prepared from freshly-dead carcasses, stain a deep blue and appear as short rods with square-cut ends, lying end to end in twos or threes, but never in long chains. All the organisms are of the same length and capsules may or may not be evident around the organisms, depending on the fixation of the film.

With the death of the animal, multiplication of anthrax bacilli in the body ceases, and in the unopened carcass the organisms soon start to

degenerate and at the same time lose their affinity for stains. The greater the delay after death before films are prepared the more marked the disintegration of anthrax bacilli and the fainter they stain, but even in extensively decomposed carcasses, when most of the organisms are degenerated, the purple-stained background may still be present.

Coinciding with the gradual degeneration of the anthrax bacilli in the blood you get a progressive increase in the number of putrefactive organisms present. As these organisms are anærobic, the conditions in the unopened carcass are favourable to their growth. There should, however, be no difficulty in distinguishing these putrefactive organisms from anthrax bacilli, as the putrefactive organisms always stain very deeply, have rounded ends and vary considerably in length. You never get a purplish halo round these organisms as you do with anthrax bacilli and, of course, if anthrax bacilli are not present in the film, the purple background will be absent. In connection with this anthrax reaction it is interesting to note that the colour reaction is also detectable by the naked eye. If you compare some of the methylene-blue-stained slides [exhibited] you will see that the difference in colour is very striking. The anthrax films reveal a definite reddish purple colour, whereas any other film stained with the same stain takes up a simple blue or blue-green colour.

I have brought along with me several anthrax slides which you can examine, and amongst them you will see an interesting one prepared, in the absence of the orthodox glass slide, on a piece of window-glass.

Discussion

Mr. T. J. Margarson, who opened the discussion on Mr. Davies' paper and demonstrations, first of all congratulated him on the excellence of his slides and thanked him for coming to the meeting and giving the members such very practical demonstrations. Amongst other questions, he asked Mr. Davies how one could differentiate microscopically between the human, bovine and avian tubercle bacilli. In reference to anthrax, Mr. Margarson said he recently had a case in a pig which had a very swollen throat and he would like to know how to take a smear from the throat in such a case. Furthermore, he desired to be informed what was considered to be a reasonable time in which one could find anthrax bacilli in the blood after death.

Other speakers who contributed to the discussion included Mr. J. C. Coleman, who asked what was the nature of the stain used for staining the anthrax films demonstrated, as in all his experience with M'Fadyean's polychrome methylene blue he had never had results similar to those demonstrated at the meeting. He also enquired about the reliance to be placed on "cell groups" in milk sediment.

Mr. G. F. Banham enquired how long after death the anthrax bacillus could be found in the blood and whether or not the organisms could be found in the blood before death.

Mr. Clement Hill thanked Mr. Davies for the demonstration, saying that it should be of great value to the older practitioners.

Mr. R. W. Hall, of Barry, cited a case in a cow in which a sample of milk taken just before death from anthrax revealed no bacilli.

The Reply

Mr. Davies, replying to the discussion (having thanked the members for the very kind and appreciative way in which they had received his demonstration) pointed out that he claimed no originality for any of the methods demonstrated to them that afternoon. They were methods which had been in use for many years and his reason for demonstrating them that afternoon was in order to try and stimulate practitioners who were not in the habit of doing their own simple laboratory examinations, to do so in future. The methods which he had demonstrated were only a few of the many which he thought could be successfully performed in the course of ordinary general practice.

Turning to the questions which had been asked, Mr. Davies pointed out, in reply to Mr. Margarson, that it was impossible to distinguish between the human, bovine, and avian strains microscopically. Such a differentiation entailed the study of the cultural characters of the organism in question and also its pathogenicity to different laboratory animals. With reference to anthrax in the pig, diagnosis was made by examining œdema fluid from the throat region and this fluid could be obtained by a small incision through the skin. Perhaps some of the members present who had some experience of dealing with such cases, could give Mr. Margarson more information on this point.

Mr. Davies then proceeded to deal with other questions on the subject of anthrax. He remarked that anthrax bacilli might be found in the carcase of an animal up to 48 hours after death, but no definite time could be laid down, as it depended entirely on the state of decomposition. The rate of decomposition depended a great deal on the season of the year and the particular species affected. Regarding their presence in the blood, it could be said, insofar as cattle were concerned, that the organisms were present, in the blood of the living animal and in numbers sufficient to be detected by the microscope, only for a few hours before death. At the time of death the blood was usually teeming with organisms. In the case of the pig and horse, however, the numbers present at death were frequently too few to be found by the microscope. In such cases examination of the œdema fluid was necessary.

In reply to Mr. Coleman, Mr. Davies pointed out that the microscopic preparations which they had examined were stained by M'Fadyean's method and, judging from Mr. Coleman's comments, even he was surprised at the marked purple reaction which could be obtained. As to the reliance to be placed on the presence of "cell groups" in milk, it should be noted that they were not, in themselves, diagnostic of tuberculous mastitis in the absence of acid-fast bacilli. They were, after all, only groups of desquamated cells and so might occur in other inflammatory conditions. Nevertheless, their presence in the milk sediment indicated the sample as very suspicious and warranted a more prolonged search for acid-fast bacilli. Also, if in examining a milk sediment one first of all examined the sediment with a low power objective and found a cell group, considerable time was often saved by examining such a group under the oil-immersion lens, as the organisms seemed to be more concentrated in them than in the rest of the field.

CANINE DISTEMPER*

The Serum-Virus *versus* the Vaccine-Virus Method of Immunisation

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In the literature sent out with distemper serum-virus immunising products, one is informed that the failures following the use of this method amount to approximately 50 per thousand, or 5 per cent.

Fortunately, failure to immunise is the only complaint against the method. Dogs that fail to become immunised are still alive to fight a natural attack of the disease. They may acquire some increased resistance, and with the means at our disposal the percentage recovery, in such cases, is high. I have also found that the period of convalescence is much reduced. In short, we may say that although the desired result is not always achieved, no dire results are associated with, or attributable to the serum-virus method. To practitioners, this fact is of considerable moment. Most of you will remember that when the vaccine-virus method was first introduced, an occasion occurred in which a country practitioner vaccinated a litter of puppies. The result of this vaccination was that some of the animals died, and the rest were rendered useless. There was a lot of discussion, in the canine world and in the veterinary press, about this catastrophe. The practitioner was subjected to much criticism. The sequel to this case did not reach the papers. Eighteen months later, the same owners had another litter of puppies. This time, a well-known town practitioner was engaged. Vaccine was given and every precaution was taken. The owners wished to leave things at this stage, but they were persuaded by the veterinary surgeon to complete the immunisation. He, the veterinary surgeon, assured them that it would be quite safe. The virus was subsequently given, with lamentable result. All the puppies had fits, and their associated troubles. Most of them died.

Has the situation altered? One frequently hears of deaths and illness after the vaccine-virus inoculation, and it is a frequent cause of discussion whenever dog-fanciers meet. Only the other day I came across a case where 75 greyhounds had been vaccinated—four died, a large number of them developed abscesses at the seat of injection, and two of the litters were gravely ill at the most critical time of their lives. These losses can probably be avoided by giving two doses of vaccine, but this procedure nearly doubles the cost of the material and necessitates an extra visit. The only alternative, therefore, was to see if the serum-virus method could be improved, and with that object in view several members of the profession started to give the virus first, the serum being given later. Wilkinson was the first to describe this method in *The Veterinary Record*. My own experiments with this method date back to about three years. The point to be established now is the length of time to be allowed between virus and serum. Major Comerford in his paper at the Llandudno Congress stated that the serum could be given directly after the virus. His statements of the results he had with foxhounds do not hold good for general practice. I vaccinated five Cairn terriers, giving an interval of 15 minutes between the two injections, and three out of the five developed what appeared to be bad attacks of distemper. Dr. Hindle, who is very interested in dogs, allows one hour as an interval, and I presume he is successful with that.

On one occasion Dr. Hindle asked me to examine a Dalmatian dog, which he had bought to send abroad, and which he had vaccinated a week previously with virus and serum. His interval between the two injections this time was one hour. I found the dog's temperature to be 102·8°F., but otherwise, it appeared to be perfectly fit. In my first experiments, I allowed an interval of eight hours, and the dogs appeared to remain in perfect health. I have now reduced the interval to three hours, as a routine practice, and so far, I have not observed that it has failed to immunise the dog completely. The animals appeared to be perfectly normal afterwards.

There are points in this method which require consideration. In one case I vaccinated three sheep-dogs—two bitches and one dog. Temperatures were taken every day for the first three days, and they were found to be slightly subnormal; they were not taken again until the sixth day, when the dogs were to be washed previous to going to a show. The two bitches had temperatures of 103° and 104°F., and the dog's temperature went up to 107°F., by the end of the day. During the whole time in which the temperatures were elevated, the dogs appeared to be perfectly fit. This rising temperature can be avoided by giving a larger amount of serum, but this is costly. It is doubtful whether it is wise to increase the amount of serum—we may thereby destroy the balance between serum and virus, and so render our attempt at immunisation abortive. If there is a rise in temperature it

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Regarding the question raised by Mr. Hall concerning anthrax bacilli in milk, he was unable to give a definite answer, as, speaking from memory, he was unaware of any work which had been done on this particular subject.

does no harm, but it does show a definite reaction to the vaccination. One can be practically certain that a dog showing such reaction will not develop distemper later in life. Such a rise in temperature, in my opinion, can be largely avoided by keeping the dog absolutely quiet and only exercising it on a lead. I have vaccinated several dogs by this method in my kennels; temperatures have been taken twice daily, but there has been no rise. I have also vaccinated Borzois and greyhounds, with a three-hour interval, in their own kennels, and by insisting on the above precautions, as a rule there has been no rise in temperature. It is probable that this temperature phenomenon occurs in natural attacks of distemper, particularly during the summer months. I have had dogs brought in suffering from slight indisposition which has passed off in 24 hours, but there has been a persistent rise in temperature for two or three weeks afterwards. The animals have never shown any other apparent signs of ill-health. There are dogs which are said to have gone through life without having had distemper; it may be that they have had a rise in temperature at some period without showing observable signs of illness. I think that nearly all these cases must occur where only one dog is kept, and there is no chance of a mixed infection. It is hardly likely to occur in kennels where a number of dogs are kept, for in those places, we know there is nearly always a mixed infection present.

A debatable point is this—whether a large dog, such as an Irish Wolfhound, is safe with the same dose of serum as suffices for a Cairn terrier. I believe that the dose of virus is sufficient for any dog. One veterinary surgeon I know always gives 20 c.c. serum to greyhounds, but this quantity makes it too expensive for the general run of our clients. It is essential, therefore, that we should try and find out with greater certainty the amount of serum required for the different breeds of dogs. Possibly, we may find that this difficulty may be overcome by giving the serum at an interval of one hour for say Great Danes, and gradually lengthening the interval for the smaller dogs. There are a number of veterinary surgeons who have vaccinated many dogs by the serum-virus method, and it would be interesting if they would give their experiences.

I should now like to refer for a little while to the treatment of distemper. There is no doubt that if a sufficient dose of serum is given within the first three days, practically every attack of distemper can be cut short. In such cases, the temperature falls to normal, and the dog appears to make a complete recovery. A point I have not established so far is this: if one took the temperature after an interval of four days, and thereafter, each day for a fortnight, would one find that the temperature rose again and would the rise persist for some time? If such does happen with an interval of two or three hours between artificial infection with the virus and the giving of serum, it should also occur with probably an interval of two or three days between the natural infection and the serum treatment. Occasionally, the serum does not act, and I quote a case in point. A dog suffering from distemper was brought into contact with five spaniel puppies. When this fact was discovered, the temperatures of the puppies were taken morning and evening, until a rise was noticed and then serum was injected. Four of the puppies gave no further trouble, but the fifth, the weakest puppy, developed a bad attack of distemper, probably owing to his lowered resistance previous to the distemper infection. Nowadays, our trouble really begins when we are asked to deal with a fully established case of distemper, and in such a case, we ought to keep it definitely in our minds that we have two troubles to deal with, first, the distemper infection, which is the least important, thanks to specific serum, and the secondary infections which often gain the upper hand, because the distemper virus has weakened or lowered the animal's resistance. As the distemper infection lasts for two or three weeks at least, the dog has no chance to recover until that time is over, and often the secondary infections have obtained such a hold by that time, that nothing can be done. One begins to wonder whether the nervous form of distemper is due to the virus or to the secondary infections. Serum sometimes seems to have the power of warding off the secondary infections. I do not remember an attack of distemper that had been cut short by serum, developing into the nervous form, and yet the virus, which must have been present, has had a chance to multiply in the dog's system. We have the same problem in hysteria; often nowadays the hysterical symptoms change into fits, which are very difficult to deal with.

The treatment of pure distemper is to give serum at once, or maybe at intervals of one or two days, according to the individual case. But, what about the treatment of secondary infections? McDonagh claims to have cured 54 cases of distemper out of 60 by the aid of S.U.P. 36. I doubt whether he has ever cured a single case. He may have cured that number of cases of infections due to the secondary invaders.

In my hands, S.U.P. 36 has given extremely good results in similar cases. My procedure is to give a dose of serum and a dose of S.U.P. at the same time. The dose of S.U.P. is ½ c.c. for small dogs, rising to 1½ c.c. for the largest dogs. The serum may be repeated according to one's judgment, but I think, contrary to what

McDonagh says, that S.U.P. should not be repeated under an interval of two days and in some cases not under three or four. McDonagh says that the interval should be one day. In using S.U.P. we make use of what is called shock therapy, and if this is overdone, it may do more harm than good. Under this line of treatment it is surprising how quickly the secondary infections clear up, and one appears to gain a definite hold over the disease. S.U.P. does not seem to exert much control over diarrhœa, as this will frequently appear after one, or even two, injections have been given. In these cases, collosol manganese usually gives the desired result.

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Discussion

Major L. P. Pugh, who opened the discussion, said that, for his part, he still believed in giving serum and virus simultaneously. He thought that, if they went to the trouble of getting the virus absolutely fresh and could make the necessary arrangements to inoculate the virus immediately into the dog, taking care that in the preparation of the solution there was no possibility of infecting the virus, just as good results would be obtained as from waiting for one, two or three hours. The virus should be injected on one side of the neck and the serum on the other. He could not see that waiting for a short interval was going to make all the difference as to whether or not an animal would give a reaction. He always had the animals kept quiet and watched carefully from the fourth to the tenth day and if during that time there was a rise in temperature he did not hesitate to give a second dose of serum. He never waited for the exhibition of any other symptoms. He must say that in the long run that method seemed to yield good results. He did not like the vaccine-virus method.

One trouble they got rather consistently was that in about five per cent. of inoculated dogs a curious local reaction developed on the side of the neck into which the injection of virus had been made. This took the form of a swelling and appeared about three or four weeks after the injection. It usually burst out and might continue to discharge for probably two or three months. He believed that the swelling was probably due to micro-organisms inoculated at the time of the injection of virus. He preferred to call the condition a granuloma rather than an abscess.

With regard to the treatment of cases of actual distemper, he agreed with Mr. Spicer that collosol manganese was very useful when diarrhœa, with dirty eyes and mouth, was present. Regarding the giving of repeated doses of serum, he preferred to give small doses rather than two or three large ones; 2½ c.c., repeated at two-day intervals, seemed to give better results.

Concerning nervous sequelæ, he had used massive doses of serum without the slightest effect. In one case recently he had used 40 c.c. of serum and collosol manganese, but the condition of nervous sequelæ was progressive and the animal would probably die.

With the bronchisepticus type of infection, the use of bronchisepticus serum was still quite effective in combination with anti-distemper serum. The only drawback with that was the question of finance.

Major T. Dalling, who followed, said that the members would remember that the Laidlaw and Dunkin original method of immunisation was the vaccine-virus method, in which vaccine made from the infected tissues of dogs was injected and, after an interval, a dose of living, virulent virus. This method was used for a number of years and, on the whole, the results were good and in the hands of many veterinary surgeons was still giving good results. This method was soon followed by the simultaneous serum-virus method. That, in many cases, also worked well, but little troubles began to appear and eventually the virus-serum method was evolved. In this method a dose of virus was given and after varying periods of time, a dose of serum. Sometimes only a few minutes' interval was left between the giving of the virus and serum—sometimes several hours. The idea seemed to be that that virus should be allowed to produce through the body cells a certain amount of antibody and then its further action should be cut out by serum. It was very difficult to say how long an interval should be left between the injection of virus and serum. They had had virus where it was possible to inject the virus into the dog to-day and forget about it for two or even three days and then just give the dose of serum without worrying, knowing that the dog would be thoroughly immunised. On other occasions, to do such a thing would have been to court disaster and the dog would have died from true virus distemper.

Major Pugh's idea, of getting the virus very fresh and injecting it, followed almost at once by serum, was sound if he was sure that the virus was very highly potent. Virus "went off" fairly rapidly and there would be a period after the virus was put into the dog before it started to act. He felt that the virus should be allowed to remain in the system for a little time in order to stimulate the production of antibody before it was cut out entirely by the serum. Different results were got with different batches of virus, depending largely on the potency of the virus when injected. In his opinion, it did not take a lot of stimulation of the cells before an active immunity was produced.

He would like to refer to the nervous form of distemper. What he felt might take place was this: The first thing one saw in distemper virus infection was a rise in temperature, and during that phase in some dogs the virus might enter the central nervous system. There was a vasculomeningeal barrier between the general circulation and the circulation of the central nervous system. In his opinion, virus could only pass through after the membrane was injured. They had recovered virus from a dog's brain some weeks after the virus was injected into the dog subcutaneously. No matter how much serum was put in no good might be done because the membranes between the two circulations might be much too fine to allow the antibodies of serum to get through, though under the above circumstances the virus might pass.

He often wondered how long immunity did last in the dog. After a dog was immunised against distemper, was that dog immune for life? If not, for how long? Was not the question of immunity in dogs really one of small doses of infection all the time? They heard, for example, that the dogs they immunised five years ago, four years ago, etc., had "stood up" all right, and one wondered if, during these years, those dogs were subjected to small infections of natural distemper.

True virus distemper—if secondary infections were not present—was not a very fatal disease; the dog would usually recover. He had seen dogs which had not had secondary infections be ill for perhaps a fortnight or three weeks and then recover; others had recovered much earlier. But if secondary infections occurred, then the case became a very different story and its treatment demanded different lines altogether than with a pure virus infection. The important secondaries were bronchisepticus, streptococci and ordinary staphylococci, and he believed that paratyphoid and paracolon bacilli played a bigger part than they thought. In connection with secondary invaders, he was convinced that in some cases the micro-organisms causing such secondary infections might, on occasion, give rise to primary infections in dogs immune to virus distemper and that such diseases were called "distemper"—thus misunderstandings often arose.

During the last 18 months or so peculiar abscesses had occurred in a small percentage of dogs following the injection of virus. The cause of that they did not exactly understand yet. They had been carrying out some experiments in that connection and hoped to publish something very soon.

Mr. Charles Roberts observed that, with regard to the dimunition of immunity, responsible veterinary surgeons had known dogs have distemper two, three and four times.

He had used the vaccine-virus method a good deal and had found that with the every-day dog—Cairn, Sealyham, Peke—it had given no trouble at all. He had one unfortunate experience with greyhounds; out of ten, four became very ill—three with dysentery and one with pneumonia.

On the advice of Mr. Dalling, when doing 14 others, he used the virus-serum method, giving serum twenty minutes after the virus, and the dogs did well.

Mr. H. Taylor stated that he had used the vaccine-virus method with perfect satisfaction for years, except in greyhounds. Several dogs had been to shows after receiving the vaccine-virus, and had not developed distemper. The virus-serum method seemed to cause abscess formation; he therefore still carried on with the vaccine-virus method. He would like Mr. Dalling's view with regard to the interval between virus and serum—should it be two hours? [Mr. Dalling replied that, if he were doing a dog of his own, he would leave an interval of two hours.]

Mr. A. Whicher expressed entire agreement with Mr. Taylor. He had only had one abscess and until quite recently had been most successful with the vaccine-virus method. Lately he had had an unfortunate experience, but thought it better not to refer to it there.

Mr. F. Marks observed that he had one or two cases of "abscesses" following immunisation. He found that, if left alone, they soon cleared up.

Last year he inoculated some dogs by the vaccine-virus method. This year, ten out of the 27 developed a slight cough; otherwise they were quite bright. They showed temperatures of 102° to 103½°. Were the dogs slightly affected with distemper again, or not?

The Reply

Mr. Spicer, in reply, said that Major Pugh had brought up the point of the use of fresh virus; He must say he had had a few failures and in each case the virus had been fresh.

Abscesses after injection seemed to be fairly common; he had never met with them—yet!

In the treatment of fits and nervous forms of distemper, normal saline used to give very good results, and in the treatment of chorea, insulin might be used. Lately he had been using insulin in considerable quantities for incoördination and for the treatment of fits following hysteria, and it had given, on the whole, extremely good results. Of course, the use of insulin was another form of shock therapy and one could get some very interesting results.

Clinical Communications

FURUNCULOSIS IN DOGS

W. HAMILTON KIRK, m.r.c.v.s.

A red setter, twelve months old, was admitted to my kennels for anti-distemper inoculation. For three days he seemed in excellent health and received vaccine. A few days after that he did not seem so well, lost appetite, had diarrhœa and slight pyrexia. At the end of two weeks, he had what was indistinguishable from distemper with pulmonary complications. Naturally, as soon as symptoms commenced he was isolated, and eventually was admitted to the hospital. Of course, virus was withheld, and the symptoms were treated in the ordinary way. During the stage of convalescence, a crop of papules appeared on the bridge of the nose and very rapidly swelled and multiplied; the hair fell out in their vicinity; they became pustules and ruptured. By this time they were much tumefied, angry-looking, nodules exuding a mixture of blood and pus, the exits for which looked as though they had been cleanly punched out with a hole-cutting machine. The whole area was under-run, and I felt confident I was dealing with follicular mange. A smear was taken and examined, with negative results. Nevertheless, I still had no doubt about the diagnosis, and reported accordingly to the owner. He was very irate and alleged that the mange must have been contracted at my kennels. I explained to him that the disease was not contagious, but that I strongly believed it to be hereditary. I then took another smear from freshly-exuded pus, but could find no sign of a demodex. A third examination produced a like result, and yet clinically I could not for one moment distinguish this disease from demodectic mange.

The owner sent his own veterinary surgeon up from the country, and we consulted together, both feeling positive follicular mange was present. The smear he took and examined was, however, still negative, and at last I was forced to believe that some other condition existed. I have studied the chapters on skin diseases in several veterinary works, and the only malady which seemed to fit the case was furunculosis. But this did not really fit, as a furuncle is described by all as a painful nodule, whereas there seemed no pain attached to the condition

of the dog's nose. Treatment with "odylen" yielded no result, and I abandoned any application directed against mange. Acriflavine in paraffin was then tried and it seemed to allay inflammation, but it did not very rapidly suppress the pus formation. Lead and zinc lotion, applied two or three times daily, had almost cleared up the lesions by the time the dog went home, and since then I have heard nothing from my client.

Strangely enough, a fortnight later a mastiff was admitted, also for anti-distemper inoculation, but as its temperature was almost steady at 102·5° to 103°, I did not inject him. He was debilitated and thin, and after a few days a crop of furuncles appeared all over this dog's chin. The skin was greatly thickened, nodulated and oozing blood-stained pus. There was no resentment upon manipulation, which seemed to alienate the condition from true furunculosis; and yet I can find no other name for the disease, as three microscopic examinations were negative. All the symptoms were, in fact, precisely similar in the two dogs. In addition, however, the mastiff developed discharging sores on the outer surfaces of the metacarpus and metatarsus.

The purport of this article, therefore, is really to draw attention to the extraordinary similarity between furunculosis and demodectic mange, and to show how easily an incorrect diagnosis can be arrived at upon clinical appearances alone. There seems, in fact, only one distinguishing feature between these two conditions; that is, the presence or absence of the demodex.

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SOME RECENT CASES OF CANCER

C. P. HYNES, M.R.C.V.S.
Lismore

Case I. *Subject.*—A nine-year-old half-Clyde gelding doing regular work. When examined, he showed considerable swelling over the superior maxillary region, extending from below the left eye to the base of the upper molars, on the same side. The animal was emaciated, with a fœtid discharge from the left nostril and intermittently from the right. Temperature and pulse were normal. With the aid of the gag and torch, two or three of the posterior molars were found to be quite loose, but exhibited no definite sign of caries. There was a distinct bulging of the hard palate, increasing towards the alveoli on the diseased side.

Diagnosis.—Disease of the sinus and alveoli, possibly of a malignant nature.

Prognosis.—Not very favourable, especially if my fears as to malignancy were realised. The animal had been working for six or eight months in this condition, the owner believing it to be due to a chronic cold, or strangles, as the submaxillary glands were also enlarged, and it was being treated in some fashion accordingly.

It was decided to operate, and after making a crucial incision over the sinus, it was found that it was unnecessary to use the trephine, as the finger was easily introduced into the diseased cavity and the bases of the molars could be felt. The bony tissue corresponding with the area of the swelling seemed to be entirely non-existent, or extremely thin. Three posterior molars were then rather easily removed, by pressure on the bases with a sound and traction from inside the mouth, though the chloroform muzzle interfered somewhat. They appeared to be held in position only by soft tissue, the osseous sockets having disappeared. They were sound but rather black. The sinus cavity, which contained a considerable amount of soft, greyish material, was thoroughly curetted, flushed out with antiseptic and packed with sterilised gauze. Specimens from the lesion were forwarded to Professor Craig at the Veterinary College, Ballsbridge, who kindly examined them and reported the case to be one of cancer. The owner was apprised, and at his urgent request the animal was destroyed.

Post-mortem revealed very extensive invasion of all the tissues on the left side of the face, including the upper portion of the nasal and turbinated bones. Much bony tissue had been destroyed and the edges of the existing bone were soft and friable. Several of the molar sockets had partially or completely disappeared.

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Case II.—*Subject.*—A four-year-old unbroken blood mare. She had been running out at grass and was in very poor condition.

Symptoms.—When seen, early in June, a hard tumour or gland with an ulcerated surface was present in the submaxillary space. Nothing definite was known as to the history—she had not had strangles or a cold, as far as the owner knew, but I expressed the view that the condition was possibly the result of unnoticed strangles or coryza infection.

The tumour, about the size of a large goose egg, was removed by operation. Section showed it to be dotted all through with bright yellow centres and presenting an appearance not unlike that seen in tubercle or actinomycosis. Having become suspicious, I sent the specimen up to the Research Laboratory for examination and the report stated that it was of a fibro-fatty nature with streptococcal centres. Healing did not take place and there was a considerable recurrence of the growth, which was again removed by operation in September. The neoplasm—now about three times its original size—had to be followed up deeply into the intermaxillary space for complete removal, and severe venous hæmorrhage, difficult to locate and arrest, resulted. This recurred for some days subsequently whenever the mare

ate or drank, despite plugging and the use of styptics. The tumour was sent to Professor Craig for examination, and I am indebted to him for the report, which stated that the specimen was a carcinoma. The mare succumbed on the 10th day, but the owner was quite satisfied once the existence of cancer became established.

. . . . .

Case III. *Subject.*—A nine-year-old roan shorthorn milch cow in fair condition, suffering from what may be described as a tumour-cavity under the left supramammary region, which yielded a most offensive odour. The owner stated that the condition was of some months' standing and attributed it to horning. He had been treating it with copper sulphate preparations to no purpose. The tuberculin test and examination of the milk for acid-fast organisms were negative. The temperature vacillated but was never far above normal.

The cow was isolated and the lesion well curetted, flushed out with antiseptic, packed and subsequently treated with astringent antiseptic injections. The result, after waiting some weeks, was unfavourable; the tumour with its internal granuloma increased and the offensive odour continued. Suspicions were now aroused that the lesion was of a carcinomatous character, and after a further curetting portions of the soft, greyish material and the more organised globular proliferations were sent to the Veterinary Research Laboratory, Drumcondra, for examination and report. This was received in due course, and stated that the lesion was one of cancer. With the owner's ready consent the animal was slaughtered forthwith.

The *post-mortem* showed that practically two-thirds of the mammary tissue of the left hind quarter was displaced by the neoplasm, which weighed nearly 4 lb. It consisted of a mass of greyish, semi-solid material, intersected and held in position by denser reddish bands of more organised tissue, giving the cut surface a somewhat marbled appearance. The line of demarcation between the healthy and diseased tissues appeared to be clear. The left supramammary gland did not seem to be involved. There was no evidence of metastatic lesions, or of tuberculosis, in the carcase.

A large amount of firm globular granulation tissue existed, especially about the external edges of the tumour cavity, where it hung like a mass of round, smooth warts, somewhat pedicled. The milk from the affected quarter, though much reduced in quantity, remained macroscopically normal to the end. Although cancer of the breast in the human subject is, unfortunately, fairly common, I do not remember having seen many cases recorded in the udder of the cow, and this is my excuse for thinking that the above case may possibly be worth reporting.

Report

AGRICULTURAL RESEARCH COUNCIL

First Annual Report*

The Agricultural Research Council, established by Royal Charter in 1931, was designed with two objects. Firstly, it was intended to complete the framework of the scheme for the supervision of scientific research supported or subsidised by national funds, the other two parts of the framework being already formed by the Medical Research Council and the Department of Scientific and Industrial Research. All three bodies are under the general direction of committees of the Privy Council. Secondly, the Agricultural Research Council was meant to advise the Ministry of Agriculture and Fisheries, the Department of Agriculture for Scotland and the Development Commission on the scientific aspects of their agricultural research work. The original members of the Council, named in the Charter, comprise agriculturalists and also men of science eminent in those subjects which underlie the practical art of farming.

The first report of the Agricultural Research Council, for the period from July, 1931, to September 30th, 1933, has just been issued (Cmd. 4718). The arduous nature of the duties assigned to the Council is shown by the fact that more than 100 meetings of Council committees and sub-committees have been held, and visits paid, often more than once, to 22 different Research Institutes or other research centres. Most of this work has been done in the course of a general preliminary survey of existing agricultural research, but special investigations have also been made in response to requests for advice from the two Agricultural Departments and the Development Commission.

On the advisory side, the Agricultural Research Council is concerned with an expenditure which in 1931 amounted to some £390,000, paid through the departments and mostly found from the Development Fund. On the executive side, the Council has the control of a research fund, which, in the period under review, amounted to £11,000. This sum was used to initiate new researches, to carry others over difficult times, and to make enquiries into the existing state of knowledge in certain important branches of agricultural science. Among the last named, the most striking is a survey of those animal diseases which may be expected to become more prevalent and dangerous if the

* Command Paper No. 4718. Published by H.M. Stationery Office, or obtainable through any bookseller. Price 3s. net.

animal population is increased under the agricultural policy of the present Government.

Eight special committees have been formed, one for each of the chief diseases, and on these committees experts from outside the Council, scientific, medical and veterinary, are serving. Some of these special committees, having completed their survey, are now superintending new researches, the need for which became apparent during their enquiry.

The report contains an account of the multifarious labours of the Council, arranged under the heads of the different subjects: the economic outlook, soil, plants, animal heredity and genetics, animal physiology and nutrition, diseases of animals, dairy research, agricultural engineering and statistical methods. Moreover, each section begins with an introduction, written for the most part by a member of the Council specially conversant with the subject, and describing its recent history and present state. Thus the report constitutes a permanent and authoritative record of the position of agricultural science in 1931-33, as well as an exposition of the work of the Council during the first two years of its existence.

The Council's survey of agricultural research is not yet complete, but enough has been done to enable the reader to obtain a fairly accurate knowledge of what is going on. It is interesting to note that the Council think that there is no wasteful overlapping, but that they have found reason in some cases to urge closer collaboration between individuals or institutions. The general effect of the report is to suggest that the present organisation, under the scientific guidance of the Agricultural Research Council, will give the nation good value for the money it spends on agricultural research.

Of perhaps more particular interest to the veterinary profession are Chapters VI and VII, the former dealing with Animal Physiology and Nutrition, and the latter with Diseases of Animals.

VI.—*ANIMAL PHYSIOLOGY AND NUTRITION.*

It is now known that many diseases are due to faults of nutrition and thus a close liaison exists, or should exist, between the study of disease and the general study of nutrition. It has been shown that, in addition to such fundamental needs as fuel and building materials, which had previously monopolised the attention of experts, the animal body requires a supply of subtler nutrients, each with some special function in support of health, growth, and fertility. Some are organic in nature, comprising in particular a group of vitamins; others are mineral elements with functions no less essential. These accessory constituents of an adequate diet are required in characteristically small amounts, but that some of them are essential for the well-being of every animal is certain. While inadequacy in respect of any one of the accessory factors above mentioned may lead to malnutrition, if the deficiency be great enough, it may result in what is to-day known as a "deficiency disease." Carefully conducted experiments are now showing that significant degrees of malnutrition can be traced to a relative lack of certain vitamins even in farm stock. Ideal nutrition calls for an ideal physiological balance among all the essential constituents of a good dietary, to reach which is the final goal of nutritional research. Present research is carried out at The Rowett Research Institute, Aberdeen, and The Cambridge Institute for Nutritional Research, the former handling the mineral and vitamin requirements of animals, and the latter undertaking work on the protein, fat, and carbohydrate elements of food. The Rowett Institute receives a Development Fund maintenance grant of about £12,000 a year, made to the Department of Agriculture for Scotland. The Duthie Experimental Farm attached to the Institute is self-supporting. A veterinary surgeon has recently been appointed to the temporary staff of the Institute. Though primarily appointed for work on contagious abortion, it would appear that his services should be of considerable value in helping to advance knowledge of the relation between nutrition and disease.

The Cambridge Institute receives from the Ministry of Agriculture and Fisheries an annual Development Fund maintenance grant of about £13,000. A sub-committee of the Animal Diseases and Nutrition Committees, visiting Cambridge, remarked on a certain lack of co-operation between Institutes, which led the Agricultural Research Council to think that the time had come for a general review of all Agricultural Institutes at Cambridge, of their relations with the University, and with its Departments. After consultation with the Ministry of Agriculture and Fisheries, the Vice-Chancellor was approached, and after exhaustive enquiry, a report was furnished. The chief changes initiated were that Agricultural Research Institutes were to work under the control of a Central Committee, the Central Committee to submit to the Ministry of Agriculture and Fisheries, and to the Agricultural Research Council, estimates, programmes of research, and annual reports of the Institutes; to foster co-operation among the different Research Institutes and the scientific departments of the University, and to decide whether an Institute should be under the immediate control of a Director, or a Committee of Management. It was further suggested that the Directors and members of the Staffs of Institutes and of advisory services should undertake as part of

their normal duties such advanced teaching in their subject as the Faculty Board of the University may request, and the Central Committee approve. The Agricultural Research Council welcomed the provision whereby research staffs can be called on to do teaching in their special subjects. They consider that most research workers benefit by doing some teaching, and teachers by doing research.

VII.—*DISEASES OF ANIMALS.*

Livestock and livestock products are by far the most important part of the output of British Agriculture, amounting in value in the agricultural year 1930-31 to £138,660,000 in England and Wales, and to £31,443,000 in Scotland, or nearly 73 per cent. of the whole agricultural output. The toll taken by disease on our flocks and herds involves a direct loss of some millions of pounds annually, while the indirect loss is incalculable. Cattle suffer continually from numerous infective enzoötic diseases (such as tuberculosis, contagious abortion, mastitis, and Johne's disease), and from epizoötics which only occur intermittently, but nevertheless are a serious scourge. Sheep and pigs are also liable to similar inroads on their health, causing a high mortality, while the rapidly increasing poultry stock of the country is subject to many causes of loss and deterioration. Moreover, some of the diseases are dangerous to human life. Children are susceptible to the bovine type of tubercle bacillus, while there is a connection between contagious abortion in cattle and undulant fever in man, and between certain forms of streptococcal mastitis and septic sore throat. To meet this perpetual loss and potential danger, measures both administrative and investigational are needed. The most important centres of research in England are the Ministry's Laboratory at New Haw, Weybridge; the Institute of Animal Pathology, Cambridge, and the Research Institute in Animal Pathology at the Royal Veterinary College, London. In Scotland valuable work, on sheep diseases in particular, is being developed by the Animal Diseases Research Association at the Moredun Institute. In consequence of the connection between animal and human diseases, in 1932 the Agricultural Research Council and the Medical Research Council established joint Committees on Tuberculosis and Thyroid Diseases, and the Agricultural Research Council arranged for representatives of human medicine to serve on several of the committees.

Tuberculosis

Research begun under the Royal Commission has since been continued at the Field Laboratories and the Institute of Animal Pathology at Cambridge. The differences in cultural and disease-producing characteristics between the human and bovine types of the tubercle bacillus and the resistance of bovines and rabbits to the human type were confirmed. The susceptibility of man and guinea-pigs to both types, human and bovine, was established, and the observation that human pulmonary consumption is almost always due to the human type was endorsed. Amongst other conclusions it has been found that the bovine type takes a large share in producing tuberculosis in children, its manifestations being chiefly confined to sites other than the lungs, and due to its entrance into the body with food. The early stages of infection are almost exclusively found in children because of the greater susceptibility at this age and the relatively large amount of milk they consume.

Investigations have also dealt with the avian type of tubercle bacillus—the third type affecting warm-blooded animals—which has definite distinctive characters and often attacks poultry and sometimes mammals. Pigs have been shown to suffer from naturally-acquired infection with any of the three types, but severe infections are usually due to the bovine bacillus, the route of entry probably always being by way of the alimentary canal.

Tuberculosis of the horse is not very rare; the bacilli isolated have unusual characters, but are probably derived from the bovine type. Sheep are rarely infected in this country, and goats very rarely, the bovine type being usually responsible. Cats and dogs are not uncommonly attacked, the former by bovine, the latter by either the human or bovine type. Monkeys, like man, may be affected with either type. The effect of B.C.G. vaccine under carefully controlled conditions is at present being tested at Cambridge, but its value in the field is by no means generally accepted. The chief objections which have been made to its use are the short time which the immunity lasts, the positive reaction to tuberculin which may be given by inoculated animals, and the uncertainty whether this strain of bacillus may regain virulence. These reputed drawbacks are now being carefully examined. The use of dead vaccines has not been sufficiently tested: so far, there is no satisfactory evidence of their practical value. Active enquiry is also going on into better methods of preparing tuberculin, especially by growing the bacillus on simpler culture media and the avoidance of prolonged heating. There is a great need for a recognised standard of tuberculin.

Johne's Disease

This chronic inflammatory disease of the intestines, due to *Bacillus paratuberculosis*, and leading to diarrhœa, wasting, and death, appears to be increasing in some parts of England. The bacillus is "acid-fast," and can only be cultivated on special media, which usually contain extracts of some other acid-fast bacillus, such

as timothy grass bacilli (*B. phlei*). It has not been found possible to transmit Johne's disease to small laboratory animals. It is spread by contamination of water and pastures with the bacilli excreted in the fæces. A product "johnin," like tuberculin, is made from cultures of the bacillus by heating and concentrating, and this reagent, when inoculated intradermally into cattle, causes a specific reaction not unlike that produced in tuberculous animals by tuberculin. Research on johnin is at present in progress.

Contagious Abortion

This serious disease of cattle commonly affects 30 or 40 per cent. of the cows in dairy herds in this country, as proved by testing the agglutination reactions of the blood, and by showing the presence of the causal bacterium, *Brucella abortus*, in the milk by inoculating guinea-pigs. The disease spreads readily, chiefly by means of the uterine discharges after abortion or calving. The bacteria are also present in the udder and milk. Inoculation of uninfected non-pregnant cows and heifers with a vaccine consisting of a living culture of *Br. abortus* is often used as a means of preventing abortion. Nevertheless, infection has resulted from the vaccination and may remain active or latent for an indefinite period, and the bacilli may be present in the milk. Opinions as to its practical value are not unanimous. A renewed search for an efficient innocuous vaccine is much needed and is in progress.

Mastitis

Several forms of mastitis occur in dairy herds, including some very acute and even fatal cases, the more common forms being the chronic and recurrent, and due to infection with streptococci of two or three distinct kinds. A uniform technique for the recognition of the different species or varieties of streptococci involved is being worked out. Preventive hygienic measures have proved of value, but no curative treatment has so far been established. The Research Institute of the Royal Veterinary College, London, has the matter well in hand.

Infectious Sterility

This disease, associated with streptococci of a different kind, and affecting thoroughbred mares, is receiving attention in the United States and in this country.

Diseases Due to Infection with Sporing Anærobic Bacteria

This large group of animal diseases, to which the generic name of Clostridium instead of Bacillus is now given, includes several serious affections in cattle and sheep, and which can be prevented to some extent by the use of vaccines consisting of toxin made harmless with formalin, and of the bacilli or their spores killed by heat or in some other way. These vaccines are undergoing further examination and trial.

For black-leg or quarter-evil in cattle and sheep, due in the main to *Cl. chauvœi*, a completely sterile satisfactory vaccine is still needed and further work is in progress. For braxy or bradsot in sheep in northern Great Britain, Ireland, and Iceland, a vaccine is used extensively to protect the sheep, and attempts are being made to improve the method of preparation. Lamb dysentery in the north of England and Scotland, due to *Cl. welchii*, and causing very high mortality, can be averted for the most part by giving antitoxin to the lambs immediately after birth, or more conveniently by vaccinating the ewes, which then communicate immunity to the lambs by way of antitoxin in the first milk. *Cl. paludis*, a very nearly related bacillus, responsible for "struck" in sheep on the Romney Marshes, produces its lethal toxin in the intestines. "Pulpy kidney" is believed to be due to another closely allied form, *Cl. ovitoxicum*. It has been chiefly observed in New Zealand and Australia, but also occurs in Great Britain. "Black disease" of sheep in Australia is probably caused by *Cl. novyi*, causing necrosis of the liver and producing its toxin.

Foot-and-Mouth Disease

Foot-and-mouth disease has been under investigation during the last nine years by the Foot-and-Mouth Disease Research Committee appointed by the Ministry of Agriculture and Fisheries. A fifth report is at present being prepared. The infective agent is a filterable virus, the particles of which are very numerous and smaller than any other known virus found in animal disease. Though the virus can easily be destroyed by heat or carefully-applied antiseptics or alkalies, it is very resistant to drying, and remains active for a long time in the body of an animal killed at the height of the disease, especially in the bones and when the carcase is kept chilled or frozen. There are three distinct types of virus, named O, A, and C, all producing attacks of disease alike clinically, but different in that an attack due to one of them does not give protection against the others. Experimentally in small animals considerable protection can be obtained against the disease with a dead vaccine, but this is difficult to prepare in sufficient quantity for practical purposes. An antiserum can be obtained from inoculated animals. In large doses this antiserum gives a limited degree of protection for ten days or so. If a stronger serum could be obtained than is at present available, it might be useful in this country under special circumstances. Production of immunity by a combined inoculation of serum and virus has been used extensively in Germany as a means of limiting

an outbreak, but the inoculated animals may act as fresh foci of infection unless strictly isolated.

Louping-Ill

This fatal disease of sheep is very prevalent in some parts of Scotland, the most prominent symptoms being spasms and paralysis due to involvement of the central nervous system. It has now been shown that the disease is transmitted by the tick *Ixodes ricinus*. Work at the Moredun Institute has disentangled the natural history of this disease and of another closely associated tick-borne fever. A protective vaccine against louping-ill has been prepared, and promises well, but is still on its trial.

Swine Fever

An infection due to a specific virus and known as swine fever is commonly accompanied by a secondary invader, *Salmonella suipestifer* or sometimes *Pasteurella suiseptica*. Attempts have been made to control the disease by using injections of the blood serum of pigs which have recovered and been reinoculated, but the results of this serum have been irregular, and after trial in England this method was discontinued. The most effective method of prevention is a combined simultaneous inoculation of virus and serum, but this method should only be used in an infected neighbourhood where the disease is already established, since infective cases of the disease are produced by the inoculation.

Swine Erysipelas

This disease is prevalent in some parts of this country, and may be very severe. The use of serum, and of a combination of serum and vaccine, are recognised methods of treatment and prophylaxis, especially in Germany, but both of these remedial materials need further improvement and standardisation.

The diseases of young pigs, which often cause heavy losses, are not clearly differentiated, and are in great need of detailed study.

Contagious Dermatitis

Contagious dermatitis of sheep has been investigated at Cambridge. A very successful protective vaccine has been prepared.

Scrapie

This disease of sheep in Scotland has so far defied all attempts to discover its cause, or to suggest measures for its prevention or cure.

Grass Sickness

The cause of grass sickness of horses, a disease which may cause very sudden death, is at present quite unknown. Efforts are, however, now being made at the Moredun Institute to follow various lines of enquiry, and recent investigations are being directed towards the search for a causative bacterial toxin.

Distemper

Distemper in dogs has during recent years been investigated at the Mill Hill Laboratories of the Medical Research Council, and that the infective agent was a filterable virus has been established on a firm basis. A highly successful method of protective inoculation has been worked out, and is being extensively used in this country and abroad. Distemper in cats was shown to be due to a virus different from that of the canine disease.

Diseases of Poultry

B. pullorum, one of the Salmonella group, causes bacillary white diarrhœa, with a very high incidence and a mortality of 60 to 80 per cent. in some pens in the first week of life. Those chickens which recover retain the bacillus as a chronic infection of the ovary and their eggs in adult life are liable to be infected, with resulting infection of the chicks on hatching. The elimination of infected birds is the recognised method of dealing with the disease, in addition to cleanliness and disinfection of the houses and coops.

Pasteurella aviseptica sometimes causes very fatal outbreaks of fowl cholera in poultry and ducks. An antiserum can be prepared to cut short an outbreak.

Tuberculosis in fowls is usually an intestinal infection, and due to the avian type of tubercle bacillus. Diagnosis can be made by a local tuberculin reaction on the wattle.

Fowl plague has seldom been present in this country. A similar infection, known as "Newcastle disease," was investigated at New Haw in 1927.

Fowl-pox is a very wide-spread disease due to the same virus as fowl diphtheria, which is commonly associated with it. A high mortality may result. A very sastifactory preventive vaccine has been prepared, following work at New Haw and Cambridge, from crusts obtained from the similar disease of the pigeon.

Paralytic symptoms in fowls may be due to several causes. One prevalent form is especially known as "fowl paralysis," usually associated with growths of lymphatic tissue in the nerve trunks. The causes and prevention are not understood, but the subject is now being attacked at more than one Research Centre.

Coccidiosis, a very wide-spread and serious disease of poultry, is due to a protozoal parasite. Research into this infection is being planned at New Haw, and at other centres.

Deficiency Diseases

The frequently fatal disease in cows known as "milk fever" has been investigated at the

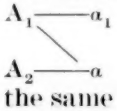
Abstracts

[Blood Groups in the Domesticated Animals. Schermer, S. (Director, Veterinary Institute, University of Göttingen, Germany). Paper No. 27, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

As has been stated in former publications, cattle, sheep and swine bear only one agglutinable character of the corpuscles A and their respective agglutinin a. There really exists in these animals at least one other agglutinin-agglutinogen pair, Bβ. In contrast to man, an important difference lies in the fact that there are animals which are carriers deficient in characteristics that relate to the properties of the serum. Therefore, the following combinations result from the structures of blood groups of swine, cattle and sheep:—

(1) Group: O$a\beta$; sub-groups: Oa, Oβ, Oo.
(2) Group: Aβ; sub-group: Ao.
(3) Group Ba; sub-group: Bo.
(4) Group: ABo.

A further differentiation is found for horses. Just as with man, there are two different types of A corpuscles and a serums. A highly sensitive A_1 reacts also with a weak a_1, and a less sensitive A_2 reacts only with a strong a. These relations are shown by the following diagram:—



It is possible that the same blood contains both A_2 and a_1. This combination occurs in about 5 per cent. of all horses. We (Kaempffer) succeeded in finding in horses four new characters of corpuscles: C, D, E, and F, and their opposite characters of serum: γ, δ, ϵ, and ζ. According to our investigations it is possible that from 0 to 5 different corpuscle characters and from 0 to 4 different serum characters are contained in the same blood. By this fact the blood groups of horses become very diversified (examples: ACDEFβ, BDE$a\gamma\zeta$, DE$a\beta$, 0$a\beta\gamma\delta$).

With all domestic animals the characters of the corpuscles are subject to the Mendelian law and are dominant over those that are missing. The characters of serum differ. With swine the serum character a is dominant to o and hypostatic to A. With horses and men the characters a and β are always homozygous and hypostatic to A or B. An exception to the rule is A_2a_1. Each horse blood contains either A or a and B or β. The newly-discovered serum characters γ, δ, ϵ, ζ, are likewise hypostatic to their respective characters of corpuscles C, D, E, F, but their mode of inheritance is different and possibly bears a recessive sign.

Many important questions remain to be worked out in researches on blood groups in veterinary medicine. This would make it possible to prevent bad accidents in making blood transfusions, to decide whether a certain animal is the offspring of certain parents or not, and finally, to render important assistance to animal breeding and place genetics on a solid foundation.

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[Therapeutics of Worm Diseases. Hall, M. C. (Chief, Zoological Division, Bureau of Animal Industry, United States Department of Agriculture, Washington, D.C., U.S.A.). Paper No. 24, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

A survey of the broad subject of control of parasites of domesticated animals shows that at the present time control measures are mostly of the order of small-scale, local, voluntary procedures of limited value. Such procedures give immediate relief in time of stress, but lead only to endless repetition and endless expense. They take no adequate cognisance of the fact that parasites wage constant effective war against us and our livestock, and that we should wage effective war against them, and not treat our parasite control problems as sporting events calling for shooting off the surplus parasite population annually. Against most of our parasites such measures permit the parasites to spread throughout the countries in which they are present and to move in international trade until they become cosmopolitan, as many of them have done and most of them, apparently, will do.

In a few cases, large-scale, nation-wide, compulsory campaigns have been carried out. In some of these instances eradication has been attained, and in others eradication is in sight. In the case of the eradication of the cattle-fever tick and the piroplasms of southern cattle fever, the cost of eradication will probably be less than the annual loss caused by these parasites. Such results point very definitely to the necessity for large-scale operations to achieve real control of parasites, and indicate that such operations, financed by relatively large expenditures over short periods of time, pay for themselves very promptly, whereas small-scale operations do not achieve real control, and must be repeated indefinitely to give even limited benefit at the

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Moredun Institute, its causes assigned to calcium deficiency in the blood, and the appropriate treatment indicated. The state of malnutrition in sheep and young cattle called "pine," in the island of Tiree, has been the subject of enquiry, and has been referred to mineral deficiencies.

The Future of Research in Animal Diseases

This portion of the Report will be dealt with specifically in another issue of *The Veterinary Record.* J. M.

points where the parasites are doing the most damage. In this connection we must stress the fact that the subject of parasite control is a special topic, comprising a knowledge of the sound application of a wide range of facts in parasitology, medicine, agriculture, and related subjects, and as such needs special consideration.

The spread of parasites in international trade calls for international action, as Skrjabin has pointed out. Such international action calls for international co-operation to prevent undue damage to international trade. Certain procedures of wide general usefulness in disease control, such as the use of sewerage systems and of meat inspection, are controlling some parasites even without special attention to their value for this purpose.

Unfavourable conditions confronting our programme of parasite control include excessive nationalism, the existence of many local governmental units, gaps in our knowledge due to insufficient research, and widespread failure to use control measures already established as of value. The magnitude of our control problems is not yet adequately estimated or appreciated.

Favourable conditions for our programme include increasing research and interest in parasitology, a rise in the general cultural level, a betterment of the basic economic status of the world, and the existence of large veterinary and zoological groups interested in parasitology and the control of parasites. When visualised and dramatised as a form of warfare, the subject of parasite control becomes much clearer as regards its magnitude and the methodology which we must develop. The formation of an international committee on control of livestock parasites is urged as a move of great value in pooling our knowledge, formulating programmes, and laying a basis for co-operation of an effective sort.

Therapeutics must take cognisance of both clinical and zoological helminthiasis. Anthelmintic medication is of value in both conditions, so far as parasite control is concerned. In addition, clinical helminthiasis may invoke to advantage adjuvant therapy such as special attention to diet, including vitamins, the use of certain minerals, and of tonics. Special therapy is required for the treatment of helminthiasis in the invasive stage.

Anthelmintic therapy is concerned with the development of useful and practical treatments, and with the development of a sound scientific basis for future work. As part of such a basis we should have more information as to the correlation between anthelmintic efficacy and the chemical and physical properties of anthelmintics, and more knowledge as to just how anthelmintics affect worms.

We need drugs effective against small worms in the lumen of the digestive tract, we need better drugs or techniques for the removal of tapeworms, and we need drugs effective against acanthocephalids. We have been unexpectedly successful in developing drugs effective in various somatic helminthiases. There are theoretical reasons why the medicinal treatment of certain somatic tapeworm infestations promises little for the future, and reasons why medicinal treatment of somatic infestation with most other worms promises success.

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[Classification of the Paratyphoid Diseases of the Domesticated Animals. Standfuss, R. (Official Veterinary Advisor, Head of the State Veterinary Research Institute, Potsdam, Germany). Paper No. 73, Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

A classification of the paratyphoid diseases of animals from a purely bacteriological point of view is impossible, because each type of bacterium does not correspond to a definite paratyphoid disease. Many a paratyphoid disease is caused by various types; again, certain types of bacteria are encountered in different paratyphoid diseases. Therefore, the bacteria of the paratyphoid-enteritidis group are to be classified from a bacteriological-serological point of view, which classification must differ from the classification of the paratyphoid diseases of animals.

For the classification of bacteria, the following chemical reactions are important tests: Fermentation of lactose, of dextrose, of sucrose, of mannitol, of arabinose, of dulcite, of rhamnose, of glycerin and of d-tartrate; and the formation of indol. Cultural-biochemical "accords" will result from this reaction, which are typical for one or more species of bacteria. The biochemical-cultural determination of the species is to be complemented and confirmed by the serological determination with the aid of the receptor analysis. The following types of the paratyphoid-enteritidis groups are of importance to the veterinarian:—

Group B:

Bacterium paratyphosum B Schottmüller (*Salmonella schottmülleri*)

Bacterium enteritidis Breslau (*Salmonella enteritidis*, var. *breslaviensis*)

Bacterium abortus equi (*Salmonella abortivo-equinus*)

Bacterium abortus ovis (*Salmonella abortivo-ovinus*)

Group C:

Bacterium suipestifer America-Kunzendorf (*Salmonella suipestifer*, var. *Kunzendorf*)

Bacterium suipestifer Glässer-Voldagsen (*Salmonella suipestifer*, var. *Voldagsen*)

Group G:

Bacterium enteritidis Gärtner-Jena (*Salmonella enteritidis*, var. *Gärtner-Jena*)

Bacterium enteritidis Gärtner-Danysz
(*Salmonella enteritidis*, var. *Gärtner-Danysz*)
Bacterium enteritidis Gärtner Dublin-Kiel (-Jensen)
(*Salmonella enteritidis*, var. *Gärtner Dublin-Kiel*)
Bacterium enteritidis Rostock (-Poppe)
(*Salmonella enteritidis*, var. *Rostock*)
Bacterium pullorum
(*Salmonella pullorum*)

Additional subdivisions, after the example of Kauffmann, will doubtless be found in the types isolated from animals. So far, however, no practical necessity exists for them in veterinary science.

The classification of the paratyphoid diseases of animals must be arranged according to the needs of the veterinary clinician, and not according to the needs of the bacteriologist. In the main, the circumstances to be considered are pathogenic ones and epidemiological ones. Consequently, the paratyphoid diseases of animals with their causative organisms, are to be classified as follows:—

I.—Primary paratyphoid diseases of animals.

1. Calf typhoid:—
Bacterium enteritidis Gärtner-Jensen,
Bacterium enteritidis Breslau,
Bacterium paratyphosum B.

2. Equine abortion: *Bacterium abortus equi.*

3. Ovine abortion: *Bacterium abortus ovis.*

4. Pig typhoid: *Bacterium suipestifer* Voldagsen. Hog paratyphoid: *Bacterium suipestifer* Kunzendorf.

5. Fowl typhoid: *Bacterium typhi gallinarum.* Pullorum disease: *Bacterium pullorum.*

6. Mouse typhoid: *Bacterium enteritidis* Breslau. Rat typhoid: *Bacterium enteritidis* Gärtner-Danysz.

7. Various paratyphoid diseases of animals:—
Bacterium enteritidis Gärtner,
Bacterium enteritidis Breslau,
Bacterium paratyphosum B,
Bacterium suipestifer Kunzendorf.

II.—Bovine enteritidis.

Bacterium enteritidis Gärtner-Jensen, *Bacterium enteritidis* Breslau, *Bacterium paratyphosum* B, *Bacterium enteritidis* Gärtner-Poppe, *Bacterium enteritidis* Gärtner-Jena (?), *Bacterium enteritidis* Gärtner-Danysz (?).

III.—Secondary paratyphoid diseases of animals.

1. Suipestifer infections of hogs:—
Bacterium suipestifer Kunzendorf.

2. Sporadic secondary paratyphoid diseases of animals:—
Bacterium enteritidis Gärtner-Jensen,
Bacterium enteritidis Breslau,
Bacterium paratyphosum B,
Bacterium enteritidis Gärtner-Poppe,
Bacterium enteritidis Gärtner-Jena,
Bacterium enteritidis Gärtner-Danysz.

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[The Coccidioses of Animals, with especial reference to the Biology of Coccidia. Pérard, C. H. (Pasteur Institute, Paris, France). Paper No. 22. Twelfth Internat. Vet. Congress, New York, 1934. *Author's Summary.*]

The biology of coccidia discloses the rational means of combating the infections produced by these parasites, based on the following facts:—

The oöcysts expelled with the fæces are not immediately infective. To mature they require favourable conditions of temperature (from 0° to 38°C.), humidity, and æration.

The minimum duration of the process of segmentation of oöcysts varies, according to the species, from 30 hours to several days. The removal of the droppings and soiled material before that time has elapsed prevents the contamination of susceptible animals and their reinfection.

Oöcysts can remain alive more than a year if the medium is humid, not infected, and at a temperature between −2° and 38°C. They are killed at temperatures above 40°C. and by freezing. They are destroyed likewise at ordinary temperatures by desiccation which, under natural conditions, apparently is the principal agent of destruction.

To segment and to remain alive, oöcysts require oxygen. They do not develop in the digestive tract after death. Fermentation impedes or arrests segmentation and soon kills oöcysts. Burying them in manure and infected material is a practical means of destroying the parasite.

Although oöcysts are sensitive to the action of physical agents, they are resistant to the action of chemical products commonly used as disinfectants; in fact, such agents favour their evolution and their conservation by sterilising, through the destruction of the microorganisms, the medium in which they are found.

It seems to be established that coccidia are, within narrow limits, specific for animal species, each being receptive to its proper parasites.

The disease can be retained in the breeding places by the adults, healthy in appearance, which harbour the parasites in their digestive tracts. The young are most frequently infected by contact with their dams after weaning.

Oöcysts ingested by non-susceptible species pass through the digestive tract as inert foreign bodies and are found again in the droppings without having undergone any alteration, but

they can still infect susceptible hosts. It is therefore advisable, as much as possible, to keep all domestic and wild animals, capable of carrying the infection, away from the breeding places.

The treatment of the affected animals is a delicate operation that rarely gives good results. It is difficult to reach the intracellular parasites without destroying the intestinal epithelium. It seems better to direct the attempts toward obtaining an intestinal pH that is unfavourable to the development of the parasite. Treatment exclusively by feeding milk without the addition of any medication, which was recommended by Carré, deserves wide experimentation.

Cured animals have acquired a resistance to subsequent infection that seems to be a true partial immunity.

The degree of immunity varies with the species of parasite, the species and age of the animal, and the intensity and repetition of the infection.

Theoretically, specific vaccination against coccidia seems to be possible. But no true vaccine exists at present.

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[**I.—A Survey for the Presence of Brucella Agglutinins in Pig's Blood in Great Britain.** Doyle, T. M. (1934.) *J. Comp. Path. & Therap.* *47*. 134.

II.—Brucella Infection of Swine. McNutt, S. H. (1934.) *J. Amer. Vet. Med. Ass.* *84*. 620.

III.—Isolation of Bacteria of the Brucella Group in Cases of Spondylitis of Swine. Feldman, W. H., and Olson, C. (1934.) *J. Amer. Vet. Med. Ass.* *84*. 628.

IV.—Isolation of Bacteria of the Brucella Group from Apparently Healthy Swine. *Ibid.* (1934.) *J. Infect. Dis.* *54*. 45.]

In his review of the literature dealing with brucella infection in pigs, Doyle draws attention to the fact that although the disease has been reported from many parts of Europe and from the North American Continent, there is as yet no information regarding its existence in Great Britain. In order to obtain confirmatory evidence regarding the prevalence of infection, he examined blood samples drawn from a representative number of bred sows and originating from various parts of Great Britain. Altogether the sera of 10,474 sows were subjected to the agglutination test (using a bovine strain of antigen), and of these four bloods gave a positive reaction in a dilution of 1-25, seventeen in a dilution of 1-50 and four in a dilution of 1-100. The author considers that the reactions in the 1-100 dilution in the case of four pigs can be interpreted as evidence of existing or recent infection, but that in the absence of the isolation of the causal organism the final proof still has to be furnished that brucella infection in pigs exists in this country.

The observations of workers in the United States, moreover, show that brucella infection in swine may result in a disease of serious consequence. For instance, McNutt describes the occurrence of a fatal disease due to this cause in three boars in which the chief lesions were arthritis and a varying degree of orchitis. Feldman and Olson contribute further evidence regarding the etiological rôle of organisms of the brucella group in the pathogenesis of a specific and characteristic form of spondylitis of swine. They have also recovered brucella organisms from the lymphatic glands of the cervical region from swine which showed specific agglutinins in their blood. S. J. E.

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[**Cattle Diseases Occurring in Palestine and Segregation and Preventive Control of Bovine Contagious Abortion.** Smith, J. M., and Gilbert, S. J. (1934.) *J. Comp. Path. & Therap.* *47*. 94.]

The control of animal diseases in Palestine is under the charge of a veterinary staff consisting of a chief veterinary officer and 14 assistant veterinary officers; there are also 44 qualified veterinary surgeons in various forms of practice. The cattle population consists of 160,000 native cattle and 14,000 dairy cattle. The former are of poor type, being subjected to periodical starvation during the long dry summer and infected with various forms of tick fever; their milk yield is negligible and their chief use is for the production of ploughing oxen. With the increase in Jewish immigration it became necessary for the numbers of dairy cattle, chiefly of the Damascus or Beyrouth breed, to be increased. At first Holland cattle were largely imported and an initial heavy mortality from tick infection was experienced until dipping was practised. An attempt to produce resistant dairy stock has also been made by crossing Holland bulls with native cows. The first cross gives a good class of cow, small and cheap to feed and with a good milk yield, but subsequent crossing does not maintain the standard.

Epizoötic Diseases:

The commoner epizoötic diseases of cattle are the following:—

(1) *Rinderpest.*—In 1926 an extensive outbreak occurred and was soon combated by the stoppage of the movement of cattle and by prophylaxis with the "serum alone" method.

(2) *Foot-and-Mouth Disease.*—Outbreaks occurred in 1931 and 1932. No general measures of control were adopted, since the disease was mild and since the economic losses incurred by such measures would far exceed those of the disease itself.

(3) *Pleuro-pneumonia and Ephemeral Fever* seldom appear.

Enzoötic Diseases:

(1) *Anthrax and Black Quarter* are prevalent throughout the country but do not cause a high mortality.

(2) *Tick Fevers.*—These can be arranged according to their order of severity as follows: *Theileria annulata, Anaplasma marginale, Babesia bovis,* and *Babesia bigeminum.* Theileriasis causes serious losses among the improved cattle pastured with native stock unless effective dipping is carried out.

(3) *Tuberculosis, Mastitis, Johne's Disease* and *Hæmorrhagic Septicæmia* are rare.

(4) *Contagious Abortion.*—Real progress has been made in the control of this disease, (which threatened to become serious following the establishment of dairy herds containing imported cattle) in spite of initial apathy on the part of the settlers. Assistance in dealing with the disease has been sought since 1929, however, and a policy of eradication has been adopted to the exclusion of vaccination methods. Since 1932 progress has been achieved by the institution of one or other of the following measures: (*a*) segregation control or (*b*) prevention control. These plans have now been in operation for four years and 19 segregation and 26 prevention settlements comprising some 3,190 cattle are under control. Settlements under prevention control do not maintain reacting animals and are thus kept free from the disease, while of the 19 herds under segregation control no less than 14 have not had a reacting animal in the clean section of the herd during the last six months. Infected cattle have been maintained in separate premises usually well removed from the clean stock and isolation within the same stable has not been attempted. Isolation of calves from infected herds is provided for in the control plan. These are tested at six months of age and have to pass two more tests before admission into the clean herd.

S. J. E.

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[Excretion of *Br. abortus* in Milk. Smith, J. (1934.) *J. Comp. Path. & Therap.* 47. 125.]

For the purpose of determining the prevalence of *Br. abortus* in samples of udder milk, the author examined firstly mixed milk samples from cows belonging to a herd which had been vaccinated with live culture two years previously, and secondly a series of random milk samples from different cows. Of the 84 vaccinated cows, 19 showed the presence of agglutinins in the milk in a concentration of 1 : 25 or over and ten, or 11·9 per cent., of the total contained living *Br. abortus.* In cases where the organism was recovered the agglutination titre of the milk was 1 : 200 or over and the corresponding blood titre was never lower than 1 : 400. It was found that there was considerable variation in the agglutination titres of milk samples from different quarters of the same cow. Of the ten Brucella strains isolated eight required added carbon-dioxide for growth and two grew under normal atmospheric conditions. (This finding suggests that after two years only two animals out of 84 were harbouring in the udder the organisms introduced in the live vaccine.) From the milk samples of 203 cows taken at random, *Br. abortus* was recovered from 23 (11·3 per cent.), and in these samples agglutinins were usually present in a dilution of 1 : 200 or more. In three instances, however, no milk agglutinins were present, although guinea-pig inoculation demonstrated the presence of *Br. abortus,* and in two instances where the milk titre was from 1 : 25 to 1 : 100 the guinea-pig test was positive.

S. J. E.

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[Malformations of the Heart in Animals. Lilleengen, K. (1934.) *Skand. Vet.-tidskr.* xxiv. 493-552. *Author's Summary.*]

The author gives a survey of various forms of malformations of the heart in animals and, in accordance with Mönckeberg, classifies them into three main groups, in agreement with the normal development of that organ. All the cases of malformation of the heart in animals, given in the literature (129 in number, apart from acardius and foramen ovale persistens), have been arranged in a scheme drawn up by Mönckeberg for Homo sapiens. The author has made commentaries on the cases, and several of the former diagnoses have been corrected.

In this connection, the author also describes 37 instances which have come under his own observation of congenital cardiac malformations in animals, *viz.*, three cases of ectopia cordis cervicalis, (two in calves and one in a cow, 13 years old); one instance of ectopia cordis pectoralis in a calf; two cases of truncus arteriosus persistens in one-year-old horses; one case of foramen primum persistens in combination with defect in the ventricular septum in a calf; 14 instances of sub-aortal septum defects (four in horses, four in cattle, two in pigs, two in dogs and two in cats); two cases of so-called Rokitansky's defect in cattle and pig; one case of vascular transposition (median form) in cattle; one case of stenosis of arteria pulmonalis, with normal position of aorta, and sub-aortal septum defect in a dog; one case of stenosis of arteria pulmonalis without septum defect in a dog; eight instances of congenital valvular anomalies in various animals and three cases of independent persistence of ductus arteriosus (two in cattle and one in a dog). Of these,

stenosis and arteria pulmonalis without septum defect has not before been described in animals. Foramen primum persistens, combined with defect in the ventricular septum, in calf; sub-aortal septum defects in pig, dog and cat; the so-called Rokitansky's defect in pig; stenosis of arteria pulmonalis, with normal position of aorta, and sub-aortal septum defect in dog, and independent persistence of ductus arteriosus in cattle, have not previously been described in these kinds of animals. Independent persistence of ductus arteriosus in the dog has previously been described in one case only.

On summarising the cases of malformations of the heart given in the literature and those observed by the author (166 cases), we find that the greater number of the former which occur in Homo sapiens are observed in animals, too, Many of the forms are rare in animals, however. The most usual congenital malformations of the heart in animals are cases of acardius, ectopia cordis cervicalis and pectoralis, sub-aortal septum defects and congenital anomalies of the valves. Foramen ovale persistens is very common, especially in cattle, but there it is most usually to be regarded as physiological.

The frequency of malformations of the heart appears to be greatest in cattle (91 cases). Then follow: horse (28 cases), dog (17 cases), pig (eight cases), ass (six cases), cat (five cases), sheep (four cases), bird (three cases), and one case each in elk, lynx, guinea-pig and rat.

In cattle, acardius and ectopia cordis cervicalis and pectoralis are the most usual forms, but sub-aortal septum defects, disturbances in ductus arteriosus and in the neighbourhood of the coronary vessels, and cor triloculare biatriatum are not so rare. In the horse, the sub-aortal septum defects and the congenital valvular defects are the most usual, while in the dog the congenital pericardial defects are those most frequently observed. The author considers the frequency of malformation of the heart in the dog to be surprisingly low, judging by the literature. Of the 17 instances summarised, eight are the author's own. It is possible that this low frequency in the dog, as also in the pig, cat and sheep, is to be ascribed in great measure to inadvertence in observation.

The congenital malformations of the heart lead, most frequently, to disturbances of the circulation and respiration immediately after birth and, in many instances, lead to the animal's early death. In a remarkably large number of cases, however, the animal does not display any symptoms, or does so only at a later stage of its life. In these instances, the congenital defect has been compensated in some way or another. The results of a sub-aortal septum defect, for instance, can be relieved by hypertrophy of the right ventricle, or by the aortal or tricuspidal valves closing the opening. An excellent instance of the heart's power of adaptability is seen, too, in cases of ectopia cervicalis in older animals (the author's own case in a cow 13 years old). In those instances where the animals display symptoms of the congenital malformation only in a later stage of their lives, this is due to the fact that the compensation has no longer sufficed; for instance, in cases of strain or stress, or where complications have arisen: endocarditis, for example.

As a rule, malformation of the heart must be considered as a very serious fault in an animal, and one which usually leads to an early death.

Review

[Encyclopædia of Veterinary Medicine, Surgery and Obstetrics. Edited by Professor G. H. Wooldridge, F.R.C.V.S., M.R.I.A. Second Edition. In two vols. Pp. xcviii + 1776; illust. 362; col. plates 6. Price £6 6s. net. Oxford University Press, 1934.]

The new edition of this Encyclopædia recently published is a notable contribution to veterinary literature. This work has been enlarged by several new chapters and brought up-to-date and the editor is to be congratulated on the general excellence of the text. As in the first edition, the Encyclopædia consists of two volumes, one devoted to Veterinary Medicine and the other to Veterinary Surgery and Obstetrics.

The volume on Veterinary Medicine is a large tome of 863 pages and contains within it a mine of information of the greatest value to veterinary students and veterinary surgeons. In addition to the chapters which are devoted to contagious and other diseases of stock, a short but clear account is given of the latter-day knowledge on hormones and vitamins, and a veterinary pharmacopœia has been compiled in accordance with the B.P. of 1932, which should be found exceedingly useful to practitioners and students.

The diseases which are of particular interest in tropical countries are given very great prominence and these parts of the work should give it an enhanced value to those engaged in tropical countries.

The new nomenclature in Bacteriology and in Parasitology has been inserted and a special chapter on some aspects of Helminths of Economic Importance in Farm Animals, together with an extensive list, is given towards the end of the volume.

It would be possible to point to slight errors or omissions here and there in a work of this scope, but one is impressed, on reading it over, with the mass of useful and up-to-date knowledge in Veterinary Medicine enclosed within

its covers. It can be thoroughly recommended as a suitable text book on Medicine for veterinary students and as a work to which veterinary surgeons can frequently refer for up-to-date information on questions of professional importance.

Review of Surgical Volume

Volume II, dealing with Veterinary Surgery and Obstetrics, comprises 815 pages and constitutes a first-class work of reference for the general practitioner and for the veterinary student. It has been brought completely up-to-date by the addition of articles on spinal anæsthesia and on nembutal and avertin narcosis.

In Professor Macqueen's excellent treatise on the examination of horses for soundness, the system of description of colours and markings of horses recommended by the sub-committee of the Royal College of Veterinary Surgeons is an important addition.

The excellence of the first edition of the work is familiar by now to most practising veterinary surgeons and there is no need to dilate upon the features of the second edition except to note the useful additions just mentioned.

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The change in the appearance of the new edition is a great improvement. The single undivided pages are easy to read and the publishers are to be congratulated on the general make-up of the volumes. The print is very clear and easily read, the paper and binding are of good quality and the illustrations with which the Encyclopædia is generously supplied, are uniformly good.

DAIRY CATTLE BILL IN ULSTER COMMONS

In Ulster House of Commons, on the Committee stage of the Diseases of Animals (Dairy Cattle) Bill,

Mr. Midgley moved an amendment to that section of Clause 1 which deals with the inspection of cattle and the expenses thereby incurred. The amendment proposed to add the lines "provided that the sum to be assessed upon the county or county borough under Section 11 of the Act of 1926 as amended by this Act shall be reduced by the actual cost to the said county or county borough of administering services which under this Act, if not administered by the said county or county borough, would otherwise have to be administered by the Ministry."

The Ministry said the acceptance of the amendment would mean that every county would then revert to the old conditions of appointing part-time veterinary officers, and there was the danger that this acceptance would mean the whole scheme would break down. Mr. Midgley did not press the amendment.

The Minister moved a new clause to the Bill providing that any veterinary officer employed by a local authority and not taken into employment by the Ministry, shall be entitled to receive from the local or sanitary authority reasonable compensation for the loss of employment.

The clause was added and the Bill passed the Committee stages.

The Shire Brood Mare and the Ante- and Post-natal Care of the Foal

Lecture by Captain O. V. Gunning, d.v.m., m.r.c.v.s.

The following is an abbreviated report of a lecture recently delivered on the above subject by Captain O. V. Gunning, d.v.m., (Ohio), m.r.c.v.s., of Tutbury, to what is described in a local press account of the occasion (a meeting following the annual dinner of the Mobberley Shire Horse Society) as "the largest and most important assembly of breeders and veterinary officers ever held in the district."

In the course of his lecture, Captain Gunning said: "I know of no other branch of live stock breeding which has been and still is burdened by so many fatalities, difficulties and disappointments as the breeding of the Shire horse and the care and rearing of Shire foals from birth to weaning. In this age of research, when our thirst for new knowledge is so great, there is a marked tendency, in our search for this knowledge, for us to overlook simple fundamental truths and natural laws. It is, however, most important to remember that these simple truths and laws are to-day as great a necessity for the successful breeding of horses and other livestock as ever they were and that omission to observe them dooms us to failure.

"The first essential for successful Shire horse breeding is to breed from sound foundation stock. 'Like begets like' is a truism in breeding as much to-day as ever. If you are so fortunately placed as to be in a district with a live Horse Society, the suitability of the sire will to a very large extent be assured and I understand that in this district you receive, from the Ministry of Agriculture, a grant for stallions and Assisted Nominations for Small Holders, and that these grants have served to bring the Mobberley Society to a very flourishing condition. I would, however, most strongly appeal to you, as breeders, to look to the dam (this has always been the weak point in Shire horse breeding) and select your mares for breeding with the utmost thought and discrimination, paying particular attention to constitution, quality and soundness, and always bearing in mind the production of progeny of first-class standard, suitable for the requirements of town commercial work. This I cannot urge too strongly, for in my opinion here lies the crux of the situation as regards the future of the heavy horse. If Shire horse breeders will supply the type of animal, then, given a gradual development in trade, in spite of all that pessimists may say to the contrary, the Shire horse will, in my opinion, take care of itself for several years to come.

"If the mare is tried regularly and is not in season in six weeks from the last breeding, providing she is healthy and normal it is more than likely that she is in foal, but if she 'turns' it is most necessary that she should be examined and treated without delay. If this course were regularly adopted the chances of success would be far greater in bringing about a favourable course, as the stallion would be relieved of unnecessary work and the risk of conveying any infection that might be present would be eliminated.

"As 70 to 75 per cent. of trouble causing sterility will be found in the womb, it is most important to pay particular attention to that organ. Any attempt to breed from mares suffering from any inflammatory condition of the uterus will inevitably lead to disappointment; the mare

will either fail to conceive or will cast her foal during some stage of gestation.

"In the thoroughbred breeding studs of Kentucky it is the practice to make laboratory examinations of material taken from the uterus of mares which fail to breed and I feel that this is worthy of more consideration by breeders and veterinarians in this country.

"When the mare has passed six weeks without a return of a heat period, she may usually be considered as safe in foal, but as a means of diagnosis this is by no means certain and even if she is in foal the embryo may be so feebly anchored in the womb that an unobserved abortion may have taken place. The mare may even never have been seen in heat again during the season, yet may finally prove barren. There are, however, two ways of telling whether the mare is in foal; these are both veterinary methods. The first is by feeling the embryo or growing foal through the mare's rectum or by examining the actual seal by way of the vagina. This method is best performed in the autumn, 100 to 130 days after service. The second way is by a "Pregnancy Test," which consists in submitting a sample of urine for examination to a laboratory specialising in that work. I think there is no doubt that, as time goes on, this test will become far more important and more generally used.

Care of the In-Foal Mare

"With regard to feeding, there are two equally disastrous evils; over-feeding and under-feeding. There is definite experimental evidence to prove that over-feeding is extremely harmful. It is essential from the outset that the mare should have good food and that the work she is required to do is of a regular and steady nature. I wish I could give you more definite information regarding the feeding of the in-foal mare for, in spite of a regular mixed diet, there quite frequently appear to occur deficiencies we do not at present properly understand. It is probable—at least in our dairying districts, where milk selling has been engaged in over a long period of years—that the pastures and hay are deficient in certain vital substances. In the famous horse-breeding districts of Kentucky the soil is rich in calcium phosphate and there is not much doubt that phosphorus and lime are highly important to the diet of the brood mare. I would, therefore, in the light of present available knowledge, advise the addition of a mineral mixture to the ration of the in-foal mare and from my own observations (albeit uncontrolled by experiment) it has appeared that iodine added to the ration of the mare during pregnancy has some preventative value against joint-evil in the newly-born foal. You will note I have said 'uncontrolled by experiment' and here I must warn you that it is unwise to come to hasty conclusions, as we are often tempted to form opinions based on inadequate data.

"What I would suggest is that you let your in-foal mare live as natural a life as possible, feed her a balanced ration with such foods as are available and, in addition, supply as mineral calcium (as slaked lime) sterilised bone meal, screened hard wood ashes and common salt; also hard hay, such as seeds, timothy and clover. The hard hays, as you are aware, are much more relished by horses than soft meadow hay and, coming from arable land, are far more likely to contain those important accessory food factors. At all times rigidly avoid mouldy or dusty foods of any kind. As conditions vary in different districts and in different farms, your veterinary attendant would be able to assist in forming a ration where any doubt arises.

"There are other factors besides feeding which should enter into the case of the in-foal mare. If she is a 'bad doer' her teeth should be examined and any sharp points or long teeth adjusted. I mention sharp points, as much permanent harm may be done by the rasping of the grinding surface by unskilled persons.

"What is even more important than the condition of the teeth is making sure that your foaling mare is free from worms. . . . Having in view the heavy losses caused through parasites, I feel certain that a great proportion of them could be prevented if 'horse sick' fields could be grazed by other stock for at least one year and the horses put on pastures that have been mown, or grazed by cattle. This system would not only be of benefit to the horses but it would be of equal benefit to all the livestock concerned. As an instance of the damage that red worms cause, Dr. Dimock records having found red worm larvæ in the bowel blood-vessels of foals three weeks of age. I have seen a fatal case of colic from the same cause in a foal a few weeks older. What is most important in connection with this is the fact that Dr. Dimock has isolated in pure culture from one of these blood-vessel nests one of the most fatal joint-ill germs. You will therefore see that an intimate relation exists between red worm infestation and joint-evil and that, therefore, to be successful, we must engage in simultaneous combat against these two most devastating scourges. The droppings of any mare doing badly should therefore be microscopically examined and, if the results are positive, the mare should be treated. The condition is, in my opinion, so serious that, in districts where infestation is heavy, I believe it would be a good investment to have all mares examined and treated. This, of course, is a matter which should be attended to before service.

"With regard to flies and external parasites, I think fly repellents could be used to far more advantage. All bot eggs should be scraped off the legs and mane with a knife; the legs should be regularly dressed for leg mites. Captain Pillers, F.R.C.V.S., has been the pioneer in bringing this scourge to the fore-front. Stamping horses are a reflection on the management of any stud and, like red-worm infestation, they cause untold loss to the horse industry. I regret that it is also necessary to mention lice. Lice infestation, I am sorry to say, is largely an innovation of our age. It is to a large extent the result of the loss of our horsemastership which is unfortunately so strikingly apparent to-day, and there is a tendency to buy lice powder instead of dandy brushes and curry combs. To allow your in-foal mare to be tormented and also to support an army of miserable lice is simply asking for an addition to the many preventable troubles and is another instance of inviting bad luck to follow bad management.

Preparation for Parturition

"As the date of parturition approaches, it is necessary to make adequate preparation for that event. With regard to the place of foaling, there is no doubt that, if the weather is suitable, outdoor foaling is the better, but, for the foal born early, a foaling box is essential and it can hardly be too large. The selection of a foaling box is of outstanding importance, and to a large extent, is often a matter of necessity according to the buildings available. Under no circumstances, however, should a mare be allowed to foal in a box which has stabled a joint-ill foal the previous

year or one that has died within a few hours of birth. The possible exception may be a modern cement-lined box which can be disinfected with formaldehyde gas; but in my experience, to use the ordinary box, which it is impossible to disinfect, is to court disaster. I must even go further and say that mares should not be allowed to foal or go near any paddock or buildings where joint-evil foals have been kept or died the previous season. I have seen stud buildings so infected that it was practically impossible to breed a living foal; I have also known Shire breeders who have had endless fatalities with joint-ill remove to another farm and have no other cases. In the light of my own experience, I would say to those with badly infected premises; 'Give up breeding or remove your foaling and early-rearing operations to an entirely different part of your farm.'"

Joint-Evil

Having dealt with the foaling, and after-care, Captain Gunning proceeded: "The time at which joint-evil is contracted and the route of infection are rendered highly important when considering the care of the in-foal mare and young foal, by reason of the fact that joint-evil is undoubtedly the most serious disease that the Shire horse breeder has to face. It is probably the cause of more deaths in foals than all the other diseases put together; indeed, joint-evil is as great a menace to the horse breeding industry as canine distemper is to that of dog breeding. 'Joint-evil,' however, is a most unfortunate name as it indicates only one form of the septicæmic condition to which foals are subject. 'Foal septicæmia,' or 'Foal blood poisoning' are names which define the disease much more accurately. The disease is not due to one particular germ; there are a number of different germs each causing a different form of the disease, some being far more deadly than others. Roughly, it may show itself in three different forms—(1) the acute form, which affects the foal at birth or before, has a sudden onset and fatal ending; (2) a sub-acute form, slightly slower in onset, but usually fatal and (3) a chronic form, which shows itself a week or even longer after birth. It is usually ushered in with a rise of temperature and with lameness—which the breeder often thinks is due to the foal galloping or an accident. This form tends to take a chronic course with suppuration and open joints and frequently after a number of weeks, terminates in death.

"In connection with the foregoing one must include the sleepy foal and the foal which develops pneumonia in the place of joint affection. Such cases certainly represent a form of germ infection or blood poisoning and personally I cannot dissociate the two conditions from so-called joint-evil.

"This brings one to the question: 'Are foals infected before or after birth?' This still remains a controversial point; to discuss it fully would require a separate lecture. After reading all available literature on the subject I would say that among research workers a strong feeling exists that a large proportion of joint-evil infection is developed after birth of the foal—most frequently, but not always, through the navel; at the same time, however, there is strong evidence that in a proportion of cases the foal is infected before birth and from the more recent research work that has been conducted and published by Dr. Dimock it would appear that we may have to modify our views on this point considerably. According to his research, in many of the fœtuses examined it was determined with finality that the infection had its origin previous to birth. His view would coincide with my own experience, and in any case one finds mares that give birth to joint-ill foals year after year and also that some foals are actually born sickly and develop acute sickness so rapidly that it seems impossible that they could have contracted the disease after they were born. However, it is only fair to say that experiments have been conducted which prove that germs entering the navel after birth can cause a rapid death without showing symptoms in the navel.

"In 1921, Dr. J. T. Edwards, M.R.C.V.S. published in *The Veterinary Record* an admirable survey of the recent investigations, in this country and others, of joint-ill in foals, collecting all the literature available on the subject, condensing it and bringing out all the important features of each contribution. Now, in 1934—13 years after—with the exception of the splendid work of Dr. Dimock there appears to be very little to add to that literature, as no further progress appears to have been made.

"In attempting the prevention of joint-evil and other attendant diseases where any fatality has occurred it is necessary to begin with the mare's genital organs at the very earliest moment. All mares that have previously aborted, given birth to a dead or sickly foal, or given birth to twins, or that have any abnormality of the womb should be clinically examined and treated. I include twins because Dr. Williams, of Cornell, has supplied evidence to show that both in mares and cows which breed twins this condition is abnormal and due to disease. This treatment may mean the loss of a breeding year, or—what it is probably more correct to say—the breeding year will actually be lost in any event, but by adopting early treatment the future breeding of the mare is much more likely to prove successful. A year's rest is often a great advantage in these cases; the aim should always be to present the mare clean and healthy at the next time of service.

"In this connection, it is very necessary to consider when is the best time to breed from any mare after foaling. Breeders of valuable animals are naturally very anxious to have their mares covered as soon as possible—if much time is lost the next foal is thrown very late in the season.

"There is also a popular idea that mares hold much better if bred at the first service. It has been my practice to advise that only those mares which are absolutely clean should be served on the 9th day. All other mares should be treated and not covered until the uterus is free from all signs of discharge. From observations made in Kentucky it would appear that not more than one out of every four mares covered on the 9th day held to service, therefore there is a possibility that the prevailing idea about holding on the 9th day will not actually bear close investigation and in this connection one cannot altogether ignore the opinion of a man intimately connected with horse breeding, Major John F. Wall, who says: 'It would seem that the small number of mares that conceive on the first service and the great danger of infection at that time are sufficiently important to be seriously considered and balanced with the factors advantageous to this practice.' He adds: 'There is no wish to suggest a change for a practice that is entirely satisfactory; the question is, is the practice of breeding all foaling mares at the first heat period basically and economically sound?'

"The show breeder also naturally likes to get early foals, but I am afraid he must be prepared to take an enhanced risk. In my experience the mortality amongst early foals is much greater

than with those born with the spring grass and I think the cold winds of the early months of the year must be regarded as an additional predisposing cause of disease.

"In connection with joint-evil I have already mentioned the sleepy foal and the foal showing lung symptoms soon after birth. In both these conditions I find the injection of the dam's blood the most satisfactory line of treatment, if done early.

Other Ailments of the Foal

"I should like to link very closely with joint-evil the condition known as pervious urachus. My personal experience leads me to view this most seriously, for these cases so frequently develop symptoms indistinguishable from foal septicæmia—possibly for the reason that the open navel offers an easy entry for offending germs—and personally I should have no hesitation in treating all these cases on joint-evil lines from the start.

"Excluding joint-evil, perhaps the most serious trouble to which the young foal is liable is that involving the digestive system. It may show itself in the form of severe abdominal pain or diarrhœa. The colicy symptoms may be caused through a series of conditions which are often very difficult to differentiate from each other. The condition may be due to neglect in removing the meconium or early fæces. It may also be due to a strangulated rupture or to a loop of bowel getting out of position. I feel most strongly, however, that a number of these cases which do not respond to treatment and end fatally are actually germ infections which have gained entrance to the stomach and bowels instead of invading the joints.

"Yet another serious condition—and one often difficult to diagnose from either of the former—is abdominal injury caused by the mare treading on the foal soon after birth. It is therefore the duty of the attendant to observe whether the mare is either vicious or clumsy and, if she is, to take every precaution to prevent injury.

"With regard to diarrhœa, this also in itself is merely a symptom and may be the result of many varying factors; therefore one's first duty is to endeavour to ascertain the cause. Diarrhœa should not be confused with the scour which usually accompanies the heat period of the mare and is no doubt due to changes in the udder during that period.

"Infectious scour is a specific disease outside the scope of this paper, and its control is a matter of hygiene. Concerning simple scour, the mare may not have sufficient milk and the young foal may be driven to eat manger food too soon; again, at other times, through some deficiency, he may take to eating filth. Professor Linton, M.R.C.V.S. has shown that the milk of the mare may be chemically wrong and that an unduly high fat content is the cause of unthriftiness and diarrhœa in foals. Time will not allow me to discuss Professor Linton's findings except to say that I am sure that his research in this connection is worthy of more attention than it appears to have received."

The lecturer, having dealt with other causes of scour in foals, with rupture and with "three things which are an ever-recurring cause of damage to foals each season, *viz.*, barbed wire, cow's horns and pits," spoke of deformities of the limbs of foals at birth as being probably due to some dietetic deficiency in the mare that is not at present understood. "Many of these conditions can be remedied by special splints or bandages or by special shoeing, but often much patience and perseverance are required in their application. Broken limbs also occur, and if the injury is not near a joint, treatment by splints should always be attempted. Foals as they grow older frequently develop boggy joints; these may be the result of over-forcing, but are probably more frequently due to a joint-ill infection at an age when they are becoming immune, whereby they escape any systemic or bodily reaction. Many of these conditions right themselves, but if they persist treatment should not be delayed, as the condition may become a permanent blemish.

"Strangles, influenza and chills are conditions likely to affect foals, especially if they visit shows or other breeding establishments with the mare. It is not the actual disease but what it so frequently leaves behind that constitutes the greatest danger. It is therefore advisable, whenever possible, to send the mare and foal by road in a conveyance which is known to be free from infection, and every effort should be made to keep them as isolated as possible at the shows. I realise, however, that this is not easy. The thermometer is here of great value; all mares and foals showing a high temperature should have their show engagement cancelled, or be sent home, as the case may be, even at the risk of losing valuable prize money.

"The practice of forcing foals for show is another source of danger. It has been experimentally proved to cause bone deformity. The foal is not only likely to go wrong in its legs and feet, but to be entirely ruined. One frequently hears the statement made that either the mare or foal was not in good enough condition to win; in other words, it is a matter of judging the ability of the attendant to 'stuff' the animals to danger point rather than the actual conformation of the animal. This brings up the question whether the whole standard of condition demanded by judges at shows does not want reviewing and whether this 'stuffing' of our best animals during the show season is actually in the interest of breeding as a whole."

The Importance of Correct Shoeing

Dealing with the shoeing of the mare and foal, Captain Gunning asked: "Is it not time, in the year 1934, to discontinue the use of those ghastly bevelled shoes? The principle of the bevelled shoe is contrary to all natural laws and is harmful to the horse. The foot is left overgrown with long toes and the frog is lifted right off the ground. In order to obtain the bevel the shoe is made so narrow on the bearing surface that the nails, which have to be far too large, have also to be nailed with an abnormal pitch. The foot thus shod, is, of course, all out of balance, breaking the axis of the leg and foot in both directions and thus putting unnecessary strain on both the coronet and tendons. With so much iron overlapping the toe, the strain at the breakover must be tremendous and yet breeders of valuable animals are willing, year after year, to have these shoeing monstrosities nailed on the feet of their horses and foals.

"The sole purpose is, as far as I can gather, to make the foot look big, but do the alleged merits of these shoes outweigh their grave defects? They may deceive a judge who does not know his job, but surely not a good judge, and I am perfectly certain that they do not deceive the astute dealer upon whom you greatly rely to buy your best saleable geldings. As an enthusiast and well-wisher of the Shire horse, I appeal to you one and all as breeders to use your influence with the Shire Horse Society to make the use of bevelled shoes at shows illegal."

N.V.M.A. Divisional Report

MID-WEST AND SOUTH WALES DIVISIONS*

Joint Meeting at Cardiff

A joint meeting of the Mid-West and the South Wales Divisions of the N.V.M.A. took place at the University College, Cardiff, on Friday, October 19th, when the following members were present:—

From the Mid-West V.A.—Mr. G. F. Banham, Captain J. R. Barker, Messrs. W. F. Barton, Norman Bisset, G. S. Bruce and A. J. Cattell, Captain J. C. Coleman, Messrs. D. E. Davies, A. E. Gachet, C. R. Golledge, S. V. Golledge, A. H. Good, R. W. Hall, Colonel G. E. Henson, Mr. F. C. Hobbs, Captain J. Howard Jones, Messrs. T. J. Margarson, J. W. Hall Masheter, J. S. Pike, C. J. Pugh, W. D. Rees, A. J. S. Reynolds, B. Sayer, J. H. Stewart, G. H. Thomas, C. Digby Watkins and W. Webster.

From the South Wales V.A.—Captain D. G. Davies, Mr. H. L. Gravelle, Captain J. C. Hill, Captain W. D. John, Messrs. D. E. Pugh, J. Stewart, T. R. Thomas, C. Watson and W. D. Williams.

Letters of apology for absence were received from Captain W. A. Austin, Mr. A. J. Baxter, Mr. J. R. Baxter, Captain F. J. Eardley, Mr. B. H. Gale, Sir Frederick Hobday, Dr. W. M. Scott and Mr. W. R. Watson.

Previous to the joint meeting, a formal meeting of the Mid-West Division was held, and the usual routine business transacted.

At the joint meeting, Captain J. R. Barker, President of the Mid-West Division, was elected to the chair, and Mr. Gwilym O. Davies gave a paper and practical demonstration on "Laboratory Methods in General Practice," which were very much appreciated and led to a good discussion. [Mr. Davies' paper, and a report of the discussion which followed the demonstration, are reproduced at the commencement of this issue. —Ed., *V.R.*]

At the conclusion of the discussion, the President said how very much they appreciated Mr. Davies' action in coming down to Cardiff, and giving his interesting and practical demonstration. Also, on behalf of the Association, he would like to thank the Principal and Registrar of the South Wales University College for providing the accommodation for demonstrating and the room for their meeting, which they very much appreciated.

A vote of thanks to Mr. Davies was then proposed by the Hon. Secretary of the Mid-West Division. This was seconded by Mr. Roger Thomas, Hon. Secretary to the South Wales Division, and carried with acclamation.

Mr. Davies, in responding, said it was a great pleasure to him to visit Cardiff, and that he wished to thank Mr. Norman Bisset for all the trouble he had taken in making arrangements for the meeting and demonstration. A vote of thanks to the Chairman for presiding was proposed by Mr. W. D. Rees and seconded by Mr. T. J. Margarson.

The members afterwards adjourned to the Park Hotel, where tea was provided.

Charles E. Perry.
T. Roger Thomas.
Joint Secretaries.

* Received for publication, November 22nd, 1934.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Dec. 17th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4 p.m.

Dec. 19th.—Meeting of the West of Scotland Division, N.V.M.A., at Glasgow.

Jan. 8th.—Meeting of Council, N.V.M.A.

Jan. 11th.—Meeting of Council, R.C.V.S.

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Death of Dr. Theobald Smith

Animal Disease in relation to Man

Veterinarians the world over will learn with the deepest regret of the death, which took place at New York on Tuesday last, at the age of 75 years, of Dr. Theobald Smith, the distinguished comparative pathologist and epidemiologist, who was president of the board of the Rockefeller Institute.

Born at Albany, New York, he graduated at Cornell in 1881, and the Albany Medical College in 1883, and was immediately appointed director of the pathological laboratory of the Bureau of Animal Industry, under the Department of Agriculture. This post he held till 1895, when he was appointed director of the pathological laboratory of the Massachusetts Board of Health, where he remained till 1915. He was also Professor of Bacteriology in the Columbian (now George Washington) University from 1886 to 1895; Professor of Comparative Pathology at Harvard University from 1896 to 1915; and director of the Department of Animal Pathology of the Rockefeller Institute for Medical Research from 1915 to 1929, when he was made director emeritus.

Theobald Smith's fame as an authority on comparative pathology is, of course, world wide. It was he who showed, as a result of his enquiry into the relations of bovine and human tuberculosis, that it was not the case that, as apparently

appeared from the investigations of Koch, the human species might be immune, or comparatively immune, from the bovine bacillus. In association with Kilborne, in 1893, Theobald Smith showed that red-water fever in cattle was transmitted by ticks; indeed, he was the first to transfer the insect transmission theory of protozoal disease from the realms of hypothesis to those of established fact. The results have been embodied in a monograph which has come to be regarded as a classic in the literature of modern pathology. In 1904 Theobald Smith reported anaphylactic symptoms in dogs and rabbits, and in a letter to Ehrlich wrote the original description of the classical anaphylactic shock in guinea-pigs, often known as the Theobald Smith phenomenon.

"For his original research and observation on diseases of animals and man," he received the coveted Copley medal of the Royal Society, which elected him a foreign member in 1932, and he was also awarded the Mary Kingsley, Kober, Flattery, Trudeau, Manson, and Gerhard medals. This year he was elected a foreign member of the French Academy of Sciences, and he was an honorary Fellow of the London Society of Tropical Medicine, and an honorary member of the Medico-Chirurgical Society and the Royal College of Physicians of Edinburgh, of the Danish Royal Academy, of the Reale Istituto of Lombardy, and of the Swedish Medical Society. Similar honours were accorded him in his own country, and he was an honorary doctor of Harvard, Yale, Princeton, Chicago, Washington, Breslau, and Budapest. He was the author of many papers in scientific journals on the nature and causation of infectious and parasitic diseases, especially the relation of cattle diseases to those of man, contributing numerous highly-valued papers to the *Journal of Experimental Medicine*, published by the Rockefeller Institute.

Those who were present at the Royal (Dick) College Centenary Celebrations in November, 1923, will have a treasured recollection of the masterly address on "Comparative Pathology: Its Biological and Economic Significance" given by Professor Theobald Smith on that memorable occasion.

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R.C.V.S. Obituary

Cowie, James, Cairnton, Fordyce, Banff. Graduated Edinburgh December 23rd, 1875; died November 26th, 1934. aged 80 years.

Crabb, David, 45, High Street, New Aberdour, Fraserburgh, Aberdeen. Graduated New Edinburgh, April 24th, 1878; died December 4th, 1934, aged 85 years.

Ellis, George, Cleveland, Mottram-in-Longdendale, Ches. Graduated New Edinburgh, May 25th, 1893; died November 28th, 1934, aged 64 years.

Jarratt, George, New Street, Longford, I.F.S. Graduated Edinburgh, December 21st, 1891; died December 6th, 1934.

MacGregor, Duncan, Yewlands Crescent, Broughton, near Preston, Lancs. Graduated New Edinburgh, December 16th, 1889; died November 25th, 1934, aged 76 years.

Warburton, Frank Shuttleworth, Dallam, Bailey's Lane, Hale, near Liverpool. Graduated Liverpool December 18th, 1906; died December 2nd, 1934, aged 53 years.

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Mr. James Cowie, J.P.

"Throughout a wide area of Lower Banffshire warm regret will be felt at intimation of the death of Mr. James Cowie, M.R.C.V.S., Cairnton, Fordyce, formerly of Greendykes and Bogtown, Ordiquhill, which took place at Cairnton yesterday," says the *Banffshire Journal* of November 27th. "Mr. Cowie, who had reached the age of 80, filled a large part in his active days in the agricultural and public life of the county and was everywhere held in highest esteem.

"A native of Ordiquhill, Mr. Cowie was born at Finnygaud, of which his father held the tenancy. After working with his father in his youth, learning practical farming, he took up the study of veterinary science and went to the Royal (Dick) Veterinary College, Edinburgh, where he passed all his examinations with much success. After qualifying as a veterinary surgeon he returned to begin practice in his native parish. He took up tenancy of East Greendykes, Ordiquhill, and in due course he built up and carried on an extensive practice throughout a wide district, wherein he came to be highly esteemed not only for his professional skill, but for his own fine personal qualities and kindly ways.

"Mr. Cowie retired from practice some 30 years ago and occasion was taken by the community to pay him signal honour in recognition of his services as a veterinary surgeon. He and Mrs. Cowie were entertained at dinner in the Hay Hall, Cornhill, and were presented with the gift of a valuable silver tea service, subscribed for by many well-wishers throughout a wide area.

"After giving up active practice, Mr. Cowie remained in East Greendykes till 1914, when he took the farm of Bogtown, also in Ordiquhill, where he had been for the past 20 years, leaving in May last on purchasing the fine farm of Cairnton, Fordyce.

"In all the affairs of the parish of Ordiquhill, Mr. Cowie in his day took a valued interest. He was a J.P. of the county, and he was for many years representative of his parish on the old County Council. He also served for a few years on the Council as reconstituted under the 1929 Act. For many years he was a member of School Board and was elected its chairman. He was a member of Aberchirder District Council during its first few years of office.

"Mr. Cowie was one of the original members of the Marnoch and Cornhill Agricultural Society and took a keen interest in the annual show and other affairs of the body, of which he was for a time president. He took a particular interest in the breeding of good Clydesdale horses and was a sound judge and adviser on points of the breed. For many years he faithfully fulfilled the duties of an elder of Ordiquhill Parish Church, and he held that office at the time of his death.

"Mr. Cowie is survived by Mrs. Cowie, and two sons."

Scotland's Oldest Practising Veterinary Surgeon

Mr. David Crabb, whose death at the great age of 85 years we record with much regret, had the distinction of being the oldest practising veterinary surgeon in Scotland. Even more remarkable, however, than the retention of his physical powers thus evidenced was the tribute to his mental vigour paid him by his fellow members of the North of Scotland Division, N.V.M.A., in electing him President for the year 1934-35.

Mr. David Crabb—"Davie" as he was affectionately known by his colleagues—entered the "New" Veterinary College, Edinburgh, in 1874. He had a distinguished career as a student, gaining certificates of merit in every class, and acted as preceptor in anatomy under the late Principal Williams. He was admitted M.R.C.V.S. in 1878, and also was given the title of veterinary surgeon by the Highland Agricultural Society.

He acted for a time as assistant to the late Mr. Andrew Spreull, Dundee, and afterwards went to Turiff to take charge of the practice of the late Mr. Tait, at that time suffering from severe injuries received in a railway accident. In 1879 he started practice in New Aberdour on the invitation of the Agricultural Society there, and fifty odd years later the society honoured him with a public testimonial.

His consuming interest in life was his profession. He took no active interest in public life, but everything that pertained to the welfare of New Aberdour had his generous support. His main interest was the Horticultural Society.

Jesting and working, his life-long characteristics, to the very end, he was popular over a wide area.

Mr. Crabb is survived by his second wife and a daughter.

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Mr. Duncan MacGregor

The *Preston Guardian* states that Mr. Duncan MacGregor, who was a well-known figure in Preston district, was a native of Rannoch, Perth. After completing his studies at Edinburgh he went to Newcastle-on-Tyne as a veterinary surgeon and later practised at Wigan and Sheffield. He went to Preston in 1902 from Sheffield, taking over a business in Chapel-walks, which he conducted until a year or two ago when he retired.

Mr. MacGregor was a prominent Freemason, being a member and past master of the Royal Preston 333 Lodge. He was also interested in sport and was associated with the Fulwood Golf Club, Preston Curling Club and Victoria Bowling Club. He was a member of the Preston Conservative Club, Guildhall-street.

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Captain F. S. Warburton

An Appreciation

We have received from a correspondent the following appreciation of the above-named member of the profession.

"The sudden death of F. S. Warburton on Sunday, December 2nd, 1934, from a heart attack, removes from the profession a quiet, unassuming, yet worthy practitioner. Qualifying at Liverpool in 1906, he soon settled down to manage the practice for the widow of the late W. A. Middlehurst, M.R.C.V.S., in Manchester Street, Liverpool, the site of which is now occupied by the Mersey Tunnel. He joined the R.A.V.C. during the War, and after the Armistice was on duty in the East. Captain Warburton was demobilised long after many of us had settled down in our old positions; he went away a youth, and came back with age and the East stamped on him. He carried on bravely until a few years ago, when he was ordered to take a long sea voyage, during which he visited New Zealand and many other countries. On his return he gradually did less veterinary work, and by the time the premises were pulled down, about a couple of years ago, he retired to a house he had built at Hale, near Liverpool, some years previously.

"'Warbie' was a bachelor, and was known to comparatively few members of the profession, but those who enjoyed his friendship were the better for it and held him in high regard. He was very fond of youngsters and the attachment was always heartily reciprocated. He was a lovable character, full of kindness for all, especially the unfortunate ones. His counsel was always wise and generous. Whenever he encountered what looked like a little sharp practice, he would often sum up the case by saying, 'I don't suppose he would have done it if he had known all the facts'; and when advised to pay the culprit back in his own coin, he would smilingly reply 'That would only make me worse than the other fellow.' He was a very good practitioner, and was very highly thought of by the firm's clients."

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Personal

Appointments

Department of Agriculture for Scotland.—To assist in the administration of their tuberculin testing scheme the Department of Agriculture for Scotland have added to their staff a supervising veterinary surgeon and two veterinary surgeons and the following appointments have been made:—

Chief Veterinary Surgeon.—Mr. John Neish Ritchie, M.R.C.V.S., D.V.S.M., B.Sc. (Veterinary Science), University of Edinburgh.

Veterinary Surgeons.—Mr. William Alexander Ireland, M.R.C.V.S., and Mr. Alastair Patrick Steele, M.R.C.V.S., D.V.S.M., B.Sc. (Agric.) London.

Mr. Ritchie was born at Turriff, Aberdeenshire, and took the diploma of M.R.C.V.S. at the Royal (Dick) Veterinary College in 1925. In the following year he obtained the diploma in Veterinary State Medicine. In 1927 he was appointed Assistant Veterinary Inspector for the City of Edinburgh and held this post until June 1929, when he was appointed Chief Veterinary Inspector for the County of Midlothian.

Mr. Ireland was born in Edinburgh and took his diploma as M.R.C.V.S. at the Royal (Dick) Veterinary College in 1923. He was for a short time a temporary Veterinary Officer with the Ministry of Agriculture and Fisheries and since 1928 he has been Assistant Veterinary Officer under the County Council of the West Riding of Yorkshire. Mr. Ireland served with the Lothian and Border Horse from 1914 to 1919.

Mr. Steele, who is the son of a missionary, was born in China. He was educated at Inverness and in London and obtained the London B.Sc. in Agriculture from Reading University in 1926. Mr. Steele thereafter was a student at the Royal (Dick) Veterinary College, became M.R.C.V.S. in 1929 and took the diploma of Veterinary State Medicine in 1930. From December, 1930, to March, 1934, Mr. Steele was a Veterinary Inspector under the Ministry of Agriculture and Fisheries and since then he has been Assistant Veterinary Officer for the County of Dumfries.

Mr. James Smith, B.Sc., M.R.C.V.S., of Aberdeen, has been appointed to the vacant post of Assistant Veterinary Officer to the Durham County Council.

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Mr. S. G. Wilson, M.R.C.V.S., has been appointed as Veterinary Officer, Nyasaland.

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MILK (SPECIAL DESIGNATIONS) ORDER, 1934

The Minister of Health has issued an order (to be cited as above) under section 3 of the Milk and Dairies (Amendment) Act, 1922, as enacted in section 10 of the Milk Act, 1934, the effect of which is to remove "Grade A" and "Pasteurised" milks from the provisions of the Milk (Special Designations) Order, 1923. The special designations which may now be used in relation to milk under a licence granted by the Minister are "Certified" and "Grade A (tuberculin tested)."

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LONDON UNIVERSITY EXAMINERS

At a meeting of the Senate of the University of London, held on November 21st, the following were appointed to act as Examiners for the Second Part II and Final Examinations in Veterinary Science for Internal and External Students in 1935:—

Veterinary Anatomy.—J. McCunn (Lecturer at R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

Veterinary Physiology.—W. L. Symes (R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

Veterinary Hygiene.—G. H. Wooldridge (R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

Veterinary Pathology.—F. C. Minett (R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

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FOOT-AND-MOUTH DISEASE

The existence of foot-and-mouth disease was confirmed on Thursday of last week among cattle and pigs at Llandimore, Cheriton, Gower Peninsula, Glamorganshire. The area subject to restrictions in the movement of animals lies in the counties of Glamorgan and Carmarthen.

Later announcements made by the Ministry of Agriculture are as follows: "The existence of foot-and-mouth disease has been confirmed among cattle at Wildhern, Andover, Hampshire. The area subject to restriction lies in the counties of Hants, Berks, and Wilts. The existence of the disease was also confirmed among cattle and pigs at Clayton West, Huddersfield (Yorkshire), and in pigs in the county borough of Barnsley. The affected pigs in both outbreaks were purchased in Barnsley Market on Monday, December 3rd; and disease has also been confirmed in pigs on the premises of the vendor at Notton, Wakefield. The area subject to restrictions lies in the counties of Yorkshire (West Riding) and Derby.

"A further outbreak has occurred in Lincolnshire, in cattle at Scamblesby, Louth."

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WHOLE-TIME VETERINARY OFFICER PROPOSED FOR MERIONETH

The Merionethshire County Council at a recent meeting, discussed a proposal to appoint a whole-time county veterinary officer at a salary of £500 per annum with travelling expenses estimated at £200.

Before the discussion the council adopted a resolution forwarded by the Shropshire County Council urging that councils with a low rateable value in proportion to the cattle population should not be called upon to bear the whole expense of a full-time veterinary officer, pointing out that as benefits would accrue to the whole community substantial financial assistance should come from the National Exchequer.

In proposing the appointment of a whole-time officer Alderman Robert Vaughan, Dolgelley, said such an appointment was long overdue. Other counties had made such appointments, and the latest to do so was the neighbouring county of Montgomeryshire.

He considered the work could not be properly done on a part-time basis. In the past three years 29 cattle were slaughtered in Merionethshire in an advanced stage of tuberculosis, which proved that the system allowing beasts to live to become so diseased was inefficient. The appointment would prove to be a true economy if only by reducing the cost of keeping people in institutions.

Captain Evan Jones, Blaenau Festiniog, agreed, adding a proposal that the council should apply for a Government grant.

Alderman R. T. Vaughan, Bala, emphasised the importance of sound farm buildngs. Whilst agreeing with what was said regarding the appointment, the speaker thought matter should not be rushed that day. The scheme must be carefully considered.

By a majority the Council decided not to appoint a whole-time officer forthwith, but a sub-committee was appointed to draw up a scheme to deal fully with the question involved.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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CHRISTMASTIDE BENEVOLENCE

To the Editor of the Veterinary Record

Sir,—I wish to express the thanks of the Council for the following donations which have been sent in order to provide special gifts to widows and orphans at Christmas-time:—

	£	s.	d.
South Eastern Veterinary Association ...	5	5	0
Mr. Mark Tailby	3	0	0
Mrs. G. H. Wooldridge	2	2	0
Mr. and Mrs. Whicher	2	0	0

Any further donations which may be received will be gladly distributed among the recipients of help from this Fund, in the hope of giving them a little additional enjoyment at Christmas.

Yours faithfully,

Fred. Bullock.
Secretary.

Victoria Veterinary Benevolent Fund,
10, Red Lion Square,
London, W.C.1.

December 11th, 1934.

The Editor acknowledges, with thanks, the receipt of the following:—

Communications from Mr. F. H. Manley (Stoke-on-Trent), and Mr. R. R. Pierse (Listowel, Co. Kerry).